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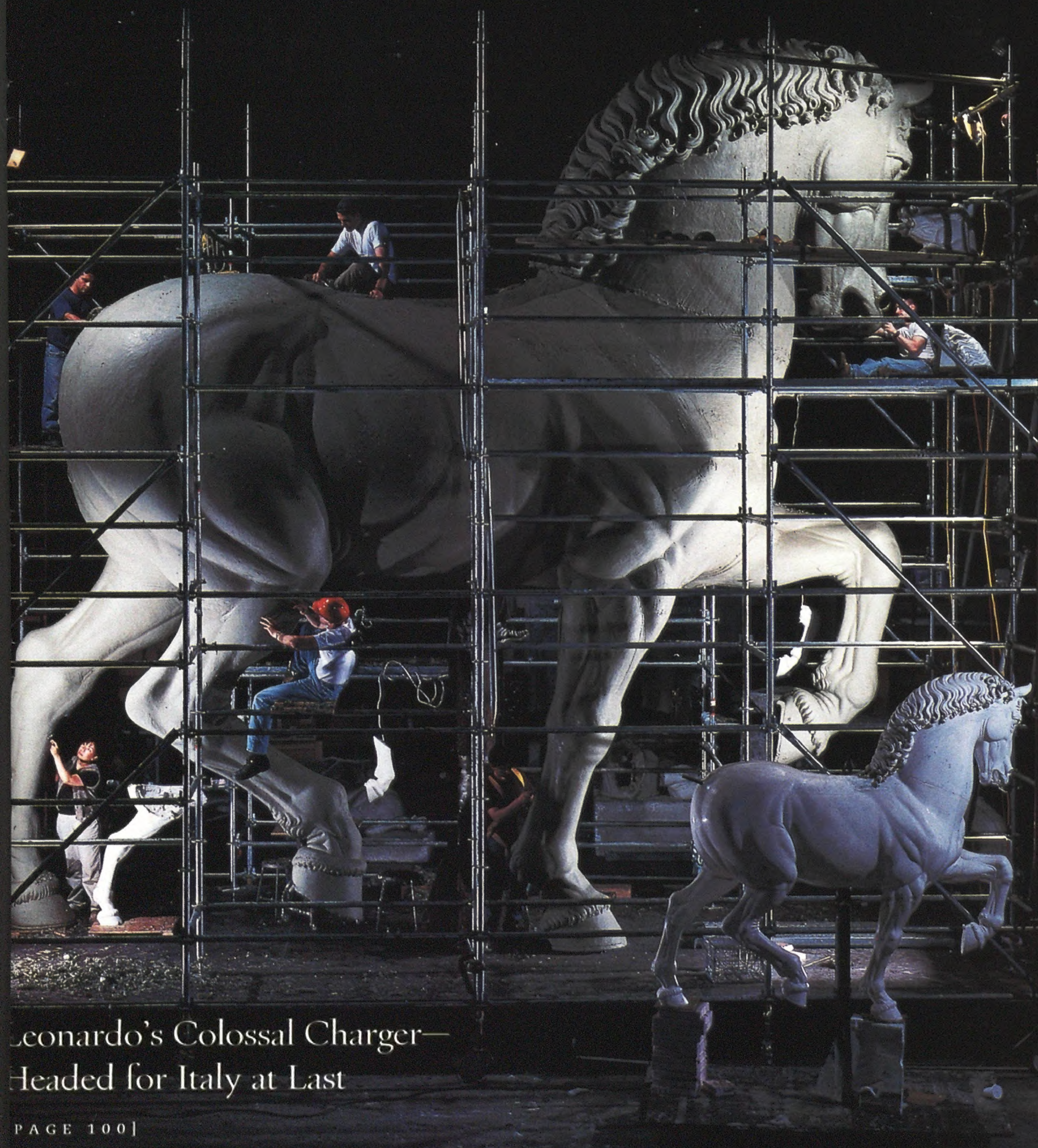

Leonardo's Colossal Charger—Headed for Italy at Last

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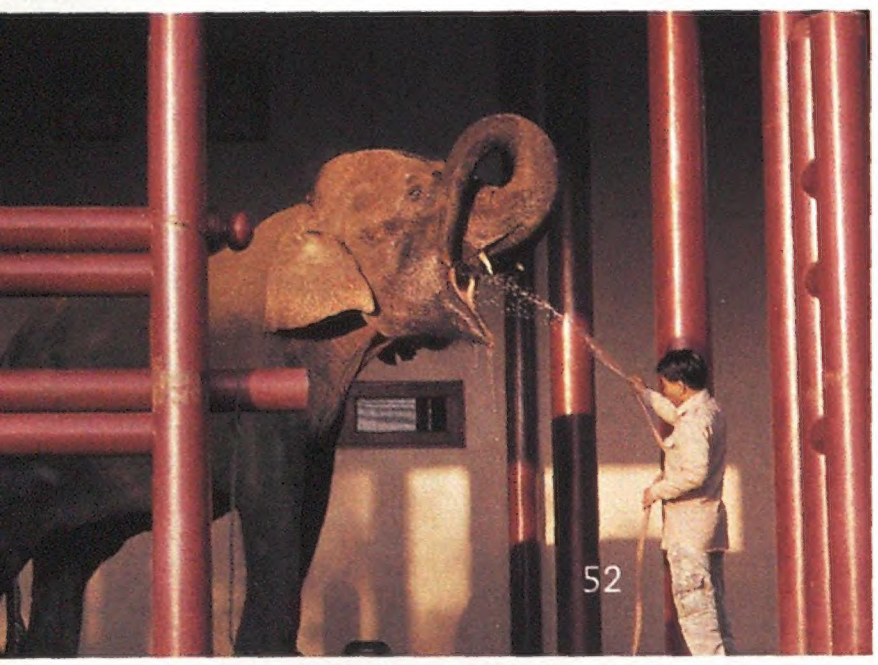

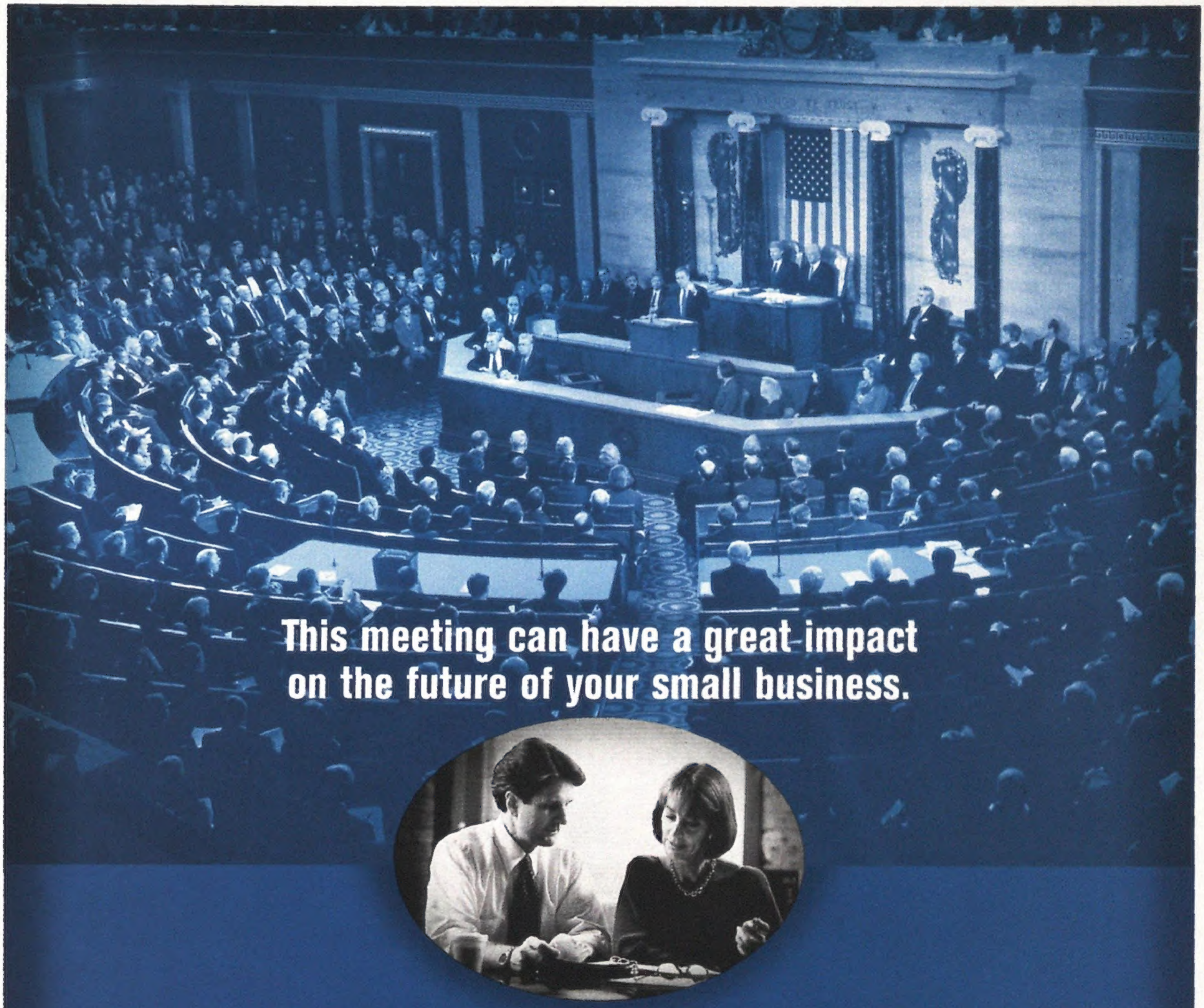

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Alex Tehrani shooting
Kodak Royal Gold 100 film.

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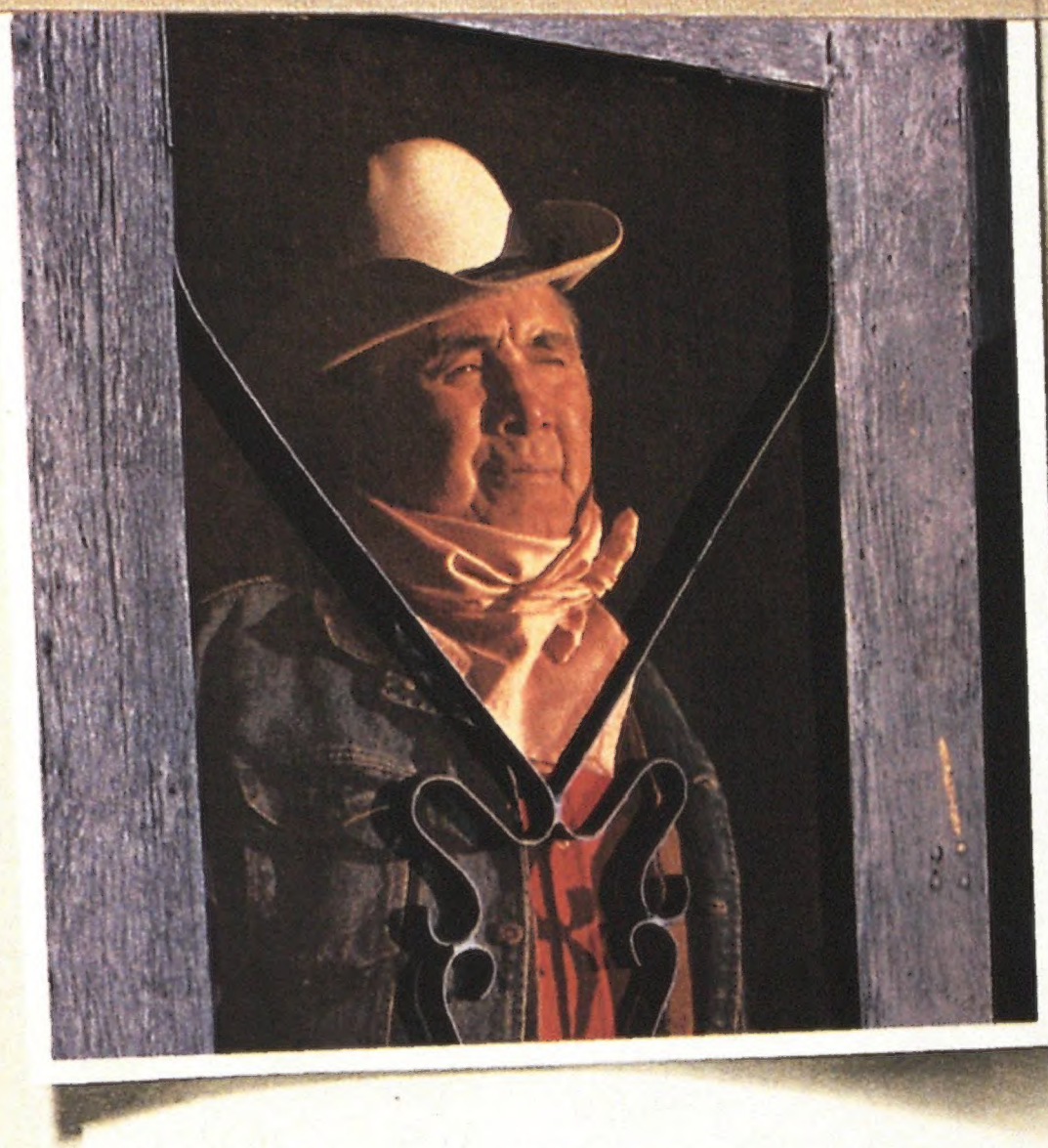

Once I get an image that's compelling, I like to blow it up. It's a way to look into the soul of the photograph and really dig into it. That's why I used Kodak Royal Gold film for this shot. It has excellent grain structure that holds its fine detail when it's enlarged.

Philip Hall

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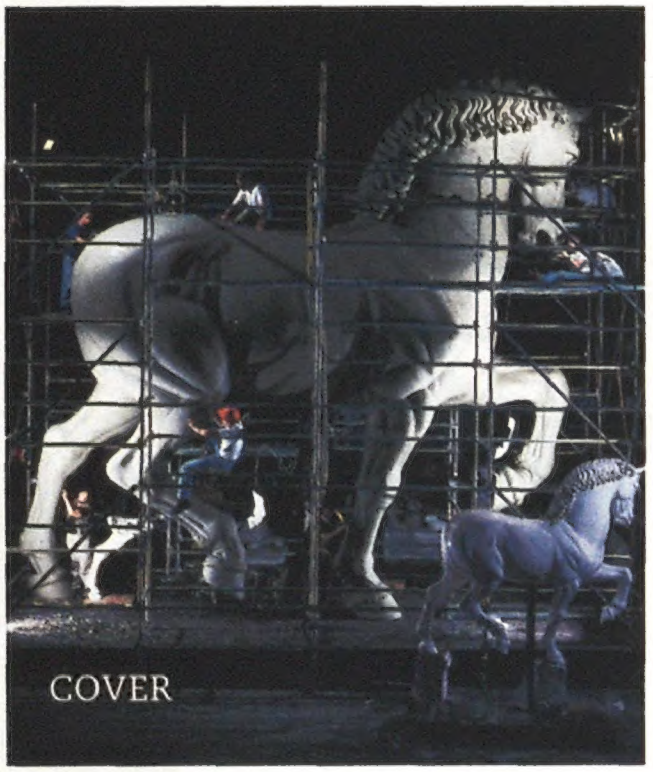

COVER

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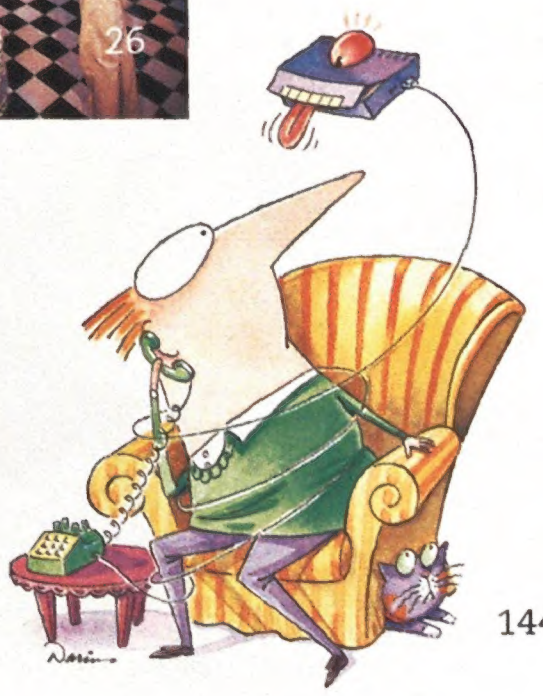

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PERSPECTIVES

Why Save the Flag?

PRESERVING THE STAR-SPANGLED BANNER REFLECTS OUR ONGOING EFFORT TO ESTABLISH A MORE PERFECT UNION

IN THE JULY ISSUE, I SPOKE OF THE SMITHSONIAN'S commitment to preserving the Star-Spangled Banner. On July 13, the President and First Lady came to the National Museum of American History to officially launch Save America's Treasures: The Millennium Program. After they pledged allegiance to this precious banner, surrounded by a group of America's children, I offered the following remarks:

As Secretary of the Smithsonian Institution, I am often asked which of our more than 140 million objects is our greatest treasure, our most valued possession. Of all the questions asked of me, this is the easiest to answer: our greatest treasure is, of course, the Star-Spangled Banner.

And yet, when you think of it, this remarkable piece of cloth fails many usual tests of value. It is certainly not the finest example of the flag-maker's art. It undeniably shows the ravages of time. And it was not, even in mint condition, made of the finest materials.

The Star-Spangled Banner's *meaning*, of course, is what lends it value beyond measure, the meaning that one American gave it when he sighted it above Fort McHenry and, thereafter, generations of Americans have given it as a symbol of their nation and the ideals it stands for. Each American flag bears some symbolic weight, but this one has endured for nearly two centuries as material witness to our national purpose.

The Smithsonian is committed to the preservation of this great icon for future generations and we are deeply grateful to President and Mrs. Clinton for sharing that resolve. But I know that we all share as well the belief that for this historic banner to flourish in our national future its renewal must be spiritual as well as material.

There are, after all, many ways to keep this flag vital.

In my mind, I link President Clinton's commitment to a "conversation on race," and to the goals of a society inviting full participation by all its members, with his commitment to the preservation of our national icons. "Can we," he asked in a speech last year, "fulfill the promise of America by embracing all our citizens?... In short, can we become one America in the 21st century?"

It is the quest for a just society for all Americans that gives these icons meaning, that makes them priceless in our national imagination.

We at the Smithsonian recognize our important roles as custodians of some of our most loved national treasures. But we see as an extension of that responsibility our obligation to provide a national place where the many communities of America can learn about each other and honor each other's past and present. We are bound together as a people not in uniformity but in shared hope and, if we get it right, mutual respect.

In this museum, not far from the flag we honor, there is an exhibition put together by the museum's director, Spencer Crew, entitled "From Field to Factory," describing the African-American migration to the North earlier in this century. It has been an important exhibition, of course, for our African-American visitors, but other visitors too have found remarkable echoes of the search for a better life by their own ancestors, of the sacrifices and aspirations that mark so many American migrations. By honoring differences we have also discovered fundamental commonalities.

The search for a more perfect union has characterized this country from its origins and shows no signs of abating in the future. It is true that there is a tension inherent in American democracy, but it is the tension marking our society's recognition of the gap between our ideals and our circumstances. It is the inability to tolerate that gap that marks us as a great people and continues to earn us our stars and stripes.

I. MICHAEL HEYMAN, SECRETARY

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SMITHSONIAN PERSPECTIVES

IN HIS JULY COLUMN, SECRETARY I. Michael Heyman remarked that the U.S. national anthem is Francis Scott Key's verse set to a "familiar English melody." The words to the first stanza of that song are: "To Anacreon in Heaven, where he sat in full glee / A few Sons of Harmony sent a petition / That he their Inspirer and Patron would be; / When this answer arrived from the Jolly Old Grecian: / 'Voice, Fiddle, and Flute, no longer be mute, / I'll lend you my name and inspire you to boot, / [Chorus] And besides I'll instruct you, like me to intwine / The myrtle of Venus with Bacchus's wine.'"

Victor E. Lund
Golden Valley, Minnesota

According to Oscar G.T. Sonneck's book *The Star-Spangled Banner* (1914), "To Anacreon in Heaven" was the club song of the Anacreontic Society, which was a gentlemen's music club. In the 1770s, they met in London once a fortnight during the winter social season. After a concert and supper, the club members sang the song "to open the mirth of the evening." Ed.

TANGIER

U.S. CONSUL SAMUEL CARR COULD not have sent cables from Tangier to Andrew Jackson, pleading with the President to take him out of "this barbarous country." Jackson was President from 1829 to 1837; Samuel Morse had not yet invented the telegraph or Morse code, and the first submarine cable had not yet been laid. Carr sent dispatches by ship.

Philip Leighly
Rolla, Missouri

THE OBJECT AT HAND

I ENJOYED JAN ADKINS' COLUMN ABOUT the gold nugget that James Marshall found at Sutter's Mill in 1848. Many Americans are not aware that the first documented discovery of gold in the United States occurred in 1799. Conrad Reed, the 12-year-old son of farmer John Reed, went bow-and-arrow fishing one spring day and found a 17-pound gold nugget in Little Meadow Creek, located in Cabarrus County, North Carolina.

John Reed used his son's large, shiny and unusual-looking rock as a doorstop for three years before attempting to sell it. He eventually took it with him to a silversmith in Fayetteville and received his asking price of $3.50, which was about a week's wages. Its value was $3,500, and the first serious gold rush was on. Initially, Reed allowed mining only in the off-season and only in certain areas. Even when plows turned up gold in his agricultural fields, he would not allow mining in them. In 1804, the U.S. Mint in Philadelphia processed gold from Cabarrus County worth $11,000.

Inspired by Reed's success, farmers in Cabarrus, Burke, Montgomery, Mecklenburg and surrounding counties started panning other creek beds. They were not disappointed. Between 1804 and 1828, North Carolina was the only state in the union that was producing gold. Even after the discovery of gold in Georgia in 1829, North Carolina produced more precious metals than any other state until the discovery of the tiny nugget at Sutter's Mill. At the height of its success, North Carolina recovered an estimated $1 million worth of gold annually.

The North Carolina gold rush brought an influx of Northerners and Europeans to the state, eager to invest in gold mining. Visitors could have heard more than 13 languages spoken in Charlotte in the 1830s. In 1832, German immigrant Christopher Bechtler struck the first gold dollar coin in the United States. Three years later, the U.S. Mint opened its first branch mint in Charlotte.

The Reed Gold Mine State Historic Site will celebrate its bicentennial next year and is developing a yearlong series of educational and family-oriented events.

Barbara Thiede, Ph.D., Historian
Reed Gold Mine State Historic Site
Stanfield, North Carolina

YOU DESCRIBED JOHN SUTTER AS A "German immigrant." Although Johann August Suter was born in the southwestern German town of Kandern, Baden, in 1803, he emigrated from Switzerland, reaching California in 1839. He changed his name and established a colony called Nueva Helvetia (New Switzerland), which eventually became what is now Sacramento. Other than William Tell, Sutter is possibly the best-known Swiss person in history.

Joe R. Sutter
San Diego, California

TRANSGENIC BREEDS

AFTER READING ALBERT ROSENFELD'S article on transgenic manipulation, I felt outraged at the arrogance of the human race, which feels free to use and distort members of another species for its own selfish benefit. How dare the human race purport its own interests to be the only ones that matter. The article made me ashamed to be human yet terrified at the thought of belonging to another, "less-important" species.

Cheryl Mainard
Grayslake, Illinois

YOUR ARTICLE MENTIONED THAT clotting factor VIII costs the average hemophiliac "about $50,000 a year." Depending on the severity of the disease, the costs can vary widely.

My 2-year-old son, Carter, has severe hemophilia, which means his blood has less than 1 percent of the clotting factor that a healthy person

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has. To prevent his condition from causing crippling joint damage, my wife and I treat him at home every other day with an infusion of 1,000 units of clotting factor VIII. The price for clotting factor ranges from $1 to $2 per unit, bringing the annual cost to more than $225,000. We are fortunate to have an excellent health insurance plan that covers 100 percent of my son's clotting factor.

The "pharming" research that your article described may eventually lead to a low-cost, abundant supply of this miraculous but expensive treatment for many other people, not only in the United States but worldwide.

Bruce Janssen
Canton, Connecticut

WHAT A FASCINATING ARTICLE ABOUT the clone/germ/gene engineers. As ever, though, I was nagged by a self-serving thought, a forlorn wish that there will be something here for me before it's too late.

I am thinking of pigs, chickens and cows that are engineered to allow me a cholesterol- and guilt-free, full farm breakfast in my twilight years. Fried eggs. Bacon. Creamed gravy. Lavishly buttered biscuits. Something that would make getting out of bed worthwhile.

Art Darwin
Morgantown, North Carolina

X-RAY TELESCOPE

WITH THE LAUNCH OF NASA'S ADvanced X-Ray Astrophysics Facility (AXAF) only a few months away, Marcia Bartusiak offered an intriguing inside look at the cutting-edge technology required to make one of the instruments on the telescope. This exceptional telescope is the third of NASA's four Great Observatories. The launch of the Space Infrared Telescope Facility in 2002 will complete the fleet.

TRW was the prime contractor that oversaw and participated in the building, assembly and testing of AXAF. A major science project of the magnitude of this large X-ray telescope involves thousands of men and women working for government, industry and universities.

Wallace Tucker
AXAF Science Center
Smithsonian Astrophysical Observatory
Cambridge, Massachusetts

LUDWIG BEMELMANS

THANK YOU FOR ROBERT WERNICK'S article on Ludwig Bemelmans, the man who created Madeline. He has always held a special place in my life. During World War II, my husband-to-be and I sent telegrams to each other. Because we were charged by the word, we had to keep our message very short. We could not say "with love" or any other emotional words in closing; we wired just the facts. My fiancé and I had shared Bemelmans' book *I Love You, I Love You, I Love You,* so we signed our wires to each other with our simple code word: "Bemelmans."

Susan Armstrong
Rochelle, Illinois

HIGHLIGHTS

AS BRUCE HATHAWAY WROTE, FLAmingos are pink because they eat so many shrimp, which contain a high concentration of carotenoids—the yellow, orange or red biological pigments that are almost universally distributed in living things. Without carotenoids, flamingos turn white. Zoos can't afford shrimp, so to keep flamingo feathers rosy, many zookeepers make sure the birds in their care drink plenty of carrot juice.

Oliver F. Guthrie
Montreal, Quebec

MOUNT INDEPENDENCE

THREE LOUD HURRAHS FOR GREG Harlin's beautiful illustrations for Richard Wolkomir's article "In Vermont, a Valiant Stand for Freedom."

Thomas B. Kendrick
Toccoa, Georgia

ALTHOUGH SOME HISTORIANS COMmonly refer to all of the nearly 30,000 Germans who fought alongside the British soldiers during the Revolutionary War as Hessians, most of Gen. John Burgoyne's German troops were, in fact, Brunswickers.

Malcolm S. MacGruer
Madison, Connecticut

JOHN CARROLL, A FRENCH-EDUCATED Jesuit priest, accompanied his wealthy Roman Catholic cousin Charles Carroll, Protestant Samuel Chase and Benjamin Franklin on their fruitless April 1776 mission to Montreal to garner support among Canadians for the American cause.

The Canadian population in Quebec was predominantly Catholic, and some of the Canadian opposition had been on religious grounds. Having two prominent Catholics on the mission had been a strategic decision.

In 1790, John Carroll became the first Catholic bishop in the United States of America. Charles Carroll was the only Catholic to sign the Declaration of Independence.

Rev. Leo McCarthy
Maryknoll, New York

THE NAME OF ONE OF GEN. JOHN BURgoyne's "two seconds-in-command" was misspelled. It is von Riedesel.

R. T. Davies
Silver Spring, Maryland

WRITE TO SMITHSONIAN

Letters for consideration in this column must include your name, daytime telephone number and street address. Letters may be edited for clarity and length. Send mail concerning the current issue to: SMITHSONIAN Letters Editor, P.O. Box 44400, Washington, DC 20026-4400, or to LettersEd@simag.si.edu. Send all other queries and comments to SMITHSONIAN, 900 Jefferson Drive, SW, Washington, DC 20560-0406.

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When Plants Migrate

THE STUDY OF HOW PLANTS MOVED NORTH AFTER THE LAST ICE AGE COULD MEAN NEW DIRECTIONS FOR CONSERVATION

BY JAMES TREFIL

THE PALEOBOTS SAY WE'VE GOT it all wrong, you know. Over the past several decades the scientists who study the history of plant life—known as paleobotanists, or paleobots for short—have been building up a picture of how groups of plants have responded to climate changes. In doing so, they've created a picture of how ecosystems evolve that may change how we think about the multi-billion-dollar business of conservation.

Back in 1889 a young explorer and biologist named C. Hart Merriam climbed 12,633-foot Humphreys Peak in the San Francisco Peaks in Arizona. He noted what many mountaineers had noted before: that as he climbed, the plant life changed radically. Starting among the cacti of the Sonoran Desert, he climbed into a pine forest at 7,000 feet and a treeless alpine tundra at the summit. It seemed to him that the plants at a given altitude were associated in what came to be called "communities"—groupings of interacting species. The idea was that over the course of time, plants that require particular climate and soil conditions come to live in the same places, and hence are frequently to be found together. An oak-hickory forest might be one such community, a spruce-fir forest another. What the paleobots are asking is whether these associations, real in the present, are permanent.

A great natural experiment took place on this planet between 25,000 and 10,000 years ago, when small changes in the earth's orbit and axis of rotation caused great sheets of ice to spread from the poles. These glaciers covered much of North America and Europe to depths of up to two miles, and then, as the climate warmed, they retreated. During this retreat, they left behind newly uncovered land for living things to colonize, and as those living things moved in they laid down a record we can read now. Today the study of tree migration is a growth industry; in the past couple of years workshops on the subject have been held in California and Australia.

Think about a lake in New England, a few miles south of the retreating ice. As plants started to grow nearby, they would release pollen into the air. Some of these grains would fall into the lake, sink to the bottom and be incorporated into the sediments. As the climate warmed and the ice sheet moved farther north, different plants would grow near the lake and their pollen grains would land in new layers of sediment. Today scientists can drill into that lake bottom, bring up a core and read the record of nearby plant life from the first colonizers at the bottom to the current tenants at the top.

When the climate changes, plants pack up and move in succeeding generations.

If communities are defined as associations of plants that migrate together as well as simply live together, you would expect to see ecosystems marching north in lockstep. The fossil record seems clear, however; there is little or no evidence that entire groups of plants moved north together. Things that lived together in the past don't live together now, and things that live together now didn't live together in the past. Instead of stable collections of plants and animals following the glaciers north, we find each individual organism moving at its own pace. At any given time during a migration, particular organisms happen to be grouped together, but those groupings are just snapshots of a continuously changing reality.

What does this lack of community during migrations say about the webs of interaction we see in current ecosystems? And what does it tell us about how we should act to conserve the natural world? In an Italian restaurant near the University of Chicago, I raised these questions with two old friends, David Jablonski and Sue Kidwell, husband and wife paleontologists who, although they normally work in different areas, have come to remarkably similar conclusions on the subject of communities. Kidwell notes that "the fossil record really makes you question how much glue there is holding communities

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"Ecosystems can stand a little loss and invasion. Some give and take need not be fatal."

together. The plants and animals don't seem to care who they're living with, and all the different combinations seem to work equally well." To which Jablonski adds: "There seems to be something like a backlash developing against the idea of communities. There's a lot more interchangeability among members of an ecosystem than people had thought."

The two are quick to point out that as with most rules relating to living systems, there are exceptions to this one. Biologists can sometimes identify a so-called keystone species—a pollinating insect, for example—that plays such a crucial role that its removal can result in the upheaval of the entire ecosystem. Nevertheless, interchangeability over geologic time seems to be much more the rule than the exception.

If the relationships between members of an ecosystem are indeed as malleable as this story suggests, then the lack of community in the northward movement of life after the glaciers is easy to understand. As each new association formed, an essential role that had been played by one species would be taken over by another. "Ecosystems can stand a little loss and invasion," says Jablonski. "Some give and take need not be fatal; in fact, it's natural."

To nail down the past, paleontologists are compiling databases of everything they have on past ecosystems. The palynologists, who study pollen, are key players, as are their colleagues who study phytoliths, microscopic glass-like secretions of plants long gone. The work involves more than academic curiosity. Policymakers have to take the best information that scientists can come up with and make difficult decisions.

As a people, we Americans have decided that we want to preserve at least a part of our natural environment. We can't preserve everything, however, and that means we have to have some way of choosing between competing conservation strategies. This choice depends, in turn, on what we think it is important to conserve. When we thought the most important thing to do was to save a species, we concentrated on how to save a particular sand dune or prairie that was home to that species. Today conservationists are more likely to talk about preserving entire ecosystems: the Greater Yellowstone Region, for example, or the Everglades.

It may be time, however, to focus on a different goal. We should concentrate on preserving the ability of plants and animals to respond to environmental changes. "We should be thinking about establishing reserves that cross environmental gradients," argues Jablonski. "We should think of ecosystems as sets of living organisms that need to expand and contract and shift around."

Such shifting already occurs in nature, of course. The Hawaiian Islands have been created by progressively newer volcanoes rising above the sea surface. As the older islands slowly sink again, the corals that are able to migrate move upward so that they remain at the same depth. Not all of them move fast enough. (Other organisms, for various reasons, have had an even harder time: Hawaii has probably lost a greater percentage of its flora and fauna than any other place in the United States.)

The fossil record seems to be telling us that we should be thinking about preserving species by giving them room to maneuver. Jablonski suggests, for example, that if we make an environmental preserve in the Amazon, we should include some foothills of the Andes to protect this kind of flexibility. That philosophy could guide the creation of new parks and preserves in other parts of the world, too.

In the United States, unfortunately, our parks and preserves are often surrounded by expensive development. It is very difficult to change boundaries that have existed for decades, even when we find out we should have done things differently. Had we known a century ago what we know now, we might, for example, have extended the boundaries of places like Yellowstone Park to include greater ranges of elevation. We might have bought more inland acres when establishing coastal preserves, to maintain the ability of coastal ecosystems to migrate landward if sea levels rise in the next century. Even if our current choices are limited, I expect that these new ideas will have an impact on how we spend our conservation dollars in the future.

The implications go further. If the climate does warm, natural ecosystems are not the only ones that will be moving north: those associated with agriculture will be doing the same. We normally think of an Iowa cornfield as a monoculture, but as every farmer knows, all sorts of varmints, weeds and insects live in even that simplified system. If the Corn Belt moves north to Minnesota, the paleobots are telling us, the rest of the "community" may not move with it like one big unhappy family. Knowing what will happen in advance could be worth billions of dollars to American agriculture.

As I left that restaurant and walked out into the cold Chicago night, I felt strangely elated. For one thing, it seemed to me that this new understanding could move the entire environmental debate to a new and more realistic level. Perhaps even more important, though, it confirmed my belief in the value of basic research, which is sometimes portrayed as the pursuit of useless knowledge. We have much to learn from something as seemingly "useless" as ancient pollen grains in the mud at the bottom of an ordinary lake.

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AROUND THE MALL & BEYOND

Scoping Out the Sky

FOR EVERYDAY FOLKS AND PRESIDENTS, TOO, THE NAVAL OBSERVATORY IS A FASCINATING PLACE TO STUDY THE STARS

BY MICHAEL KERNAN

Physicist Geoff Chester, right, shows visitors the 12-inch refractor telescope at the Naval Observatory in Washington, D.C.

TELESCOPES ARE LIKE BOATS: AS SOON AS YOU OWN ONE, you want a bigger one.

But if you just want to look at the stars, there is plenty to see at the Naval Observatory in Washington, D.C. Monday nights at 8:30, public tours are given for the the first 90 people who arrive. Depending on the weather, they either look through or at some of the telescopes there.

And the Smithsonian Associates have been taking people there for years. In fact the observatory holds classes four times a year for 60 lucky Associates.

I was even luckier: I had a private tour with Geoff Chester, a physicist who worked for years at the National Air and Space Museum before coming to the observatory, where his great-grandfather, Colby M. Chester, was once the superintendent.

The Naval Observatory is set on a knoll on the west side of Washington and has a mansion on its grounds that has become the Vice President's residence.

The observatory is a wonderful old building with the original 15-foot ceilings, broad staircases and 19th-century air-conditioning, which mainly consists of large doorways and windows. At one end stands one of the finest astronomical libraries in the Western Hemisphere, with a fountain, a balcony and 80,000 volumes dating as far back as 1482.

The rest of the building houses astronomers and the Navy oceanography staff, evidently on the theory that the earth's blanket of air is a sea, too. The observatory, designed by Richard Morris Hunt (who also created the base of the Statue of Liberty), and the mansion, designed by Leon Dessez, were completed in 1893. For years the superintendent of the observatory lived in the house.

Unfortunately for him, in 1928 the Chief of Naval Operations happened to go to a party there and liked the place a lot. Since the chief had four stars and the superintendent was a mere captain, the latter soon found himself moving out while the former moved in.

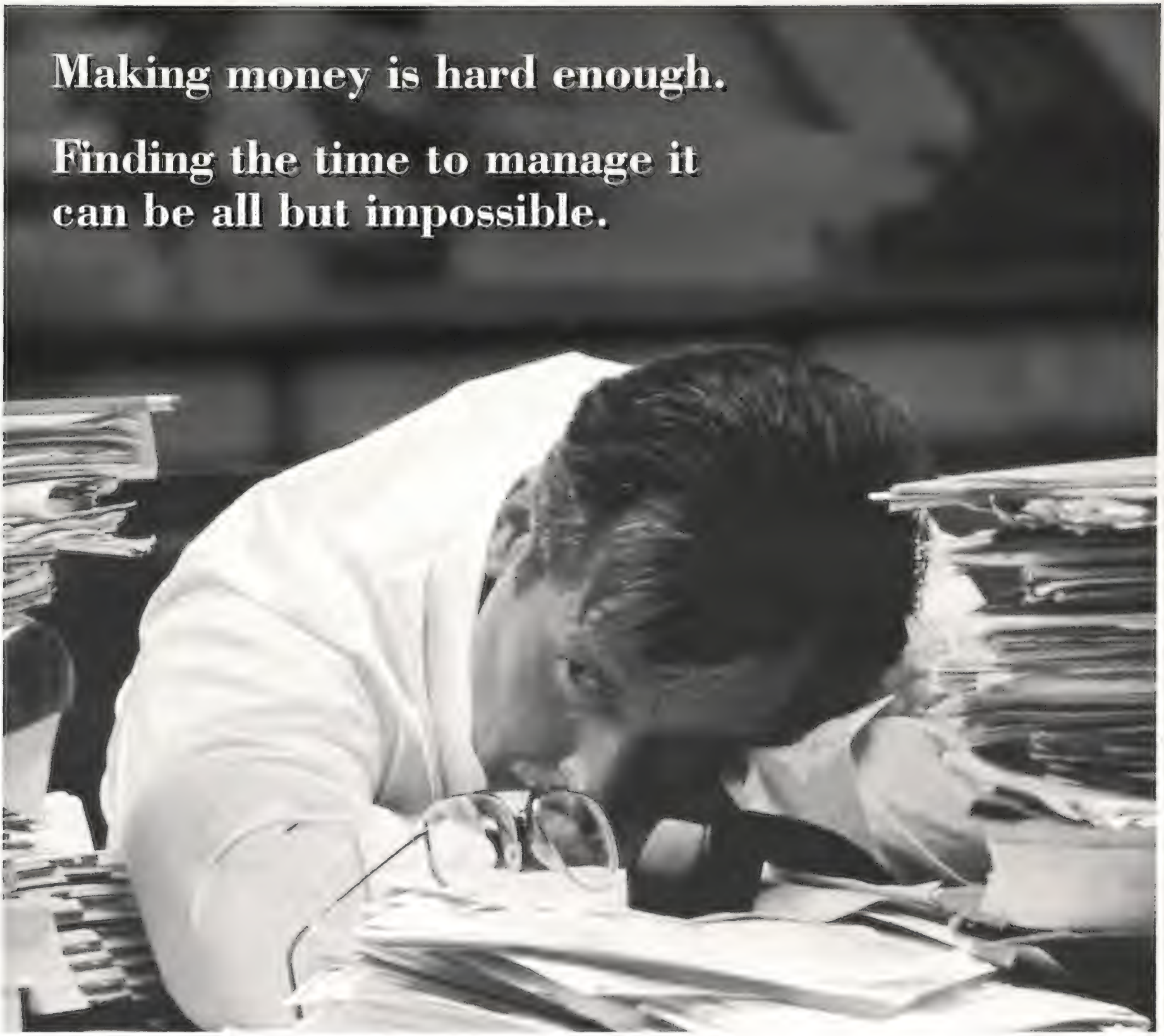
Not until 1977 did the Vice President actually reside at the mansion, in the person of Walter Mondale. The telescopes fascinated him, too. One night when Chester was studying Jupiter on a 5-inch scope in one of the outer buildings, he heard a knock on the door. And a voice. "What you looking at? Can I have a look?"

He let the visitor in. It was Mondale.

That's nothing. Once many years ago when the observatory was located in Foggy Bottom, the great astronomer Asaph Hall was up on the roof peering through a 9.6-inch scope. Suddenly the trapdoor opened and a certain familiar visage came into view: President Abraham Lincoln, wandering the town by night, had stopped in for a look.

Malarial Foggy Bottom, near the Potomac, was not the best spot for viewing the heavens but was still better than 17th and G streets, where the first observatory was erected in 1830.

We checked out the 12-inch scope in the present obser-



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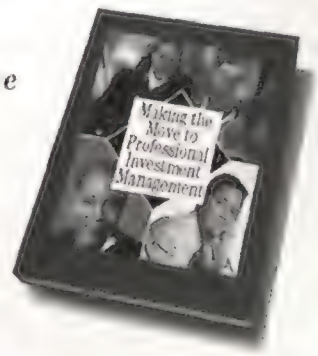

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The observatory holds offices, a library, left, and domed tower.

vatory's dome, a classic refractor built in 1895. This is the one the public usually gets to look through.

"This was used extensively until the '50s," Chester said, "when it was replaced by a camera that photographed the moon against the stars. You need the star background to determine the exact orbit of the moon, which, for instance, was kind of vital for the Apollo program. You wouldn't want to find yourself a mile off your calculations as you came in for a landing. After Apollo was finished the scope was dismantled." Later the staff rebuilt the scope, which Chester says is hard to beat for clarity of detail.

"It doesn't have the aperture of the 26-inch telescope, of course, but on any given night, sky conditions favor this over the larger one for a sharp picture of, say, the surface of Mars. It's the optics."

The lenses for both scopes were made by Alvan Clark and Sons, and apparently Clark improved his skill in the 22 years between these jobs.

"Clark really had a knack for working glass," Chester added. "He would test a lens in his workshop, sight a star with it and throw it out of focus so he could see where the defects were. Then he would put some optical rouge on his thumb and actually feel where the error was, the tiny bump in the surface, and polish it away."

On the nights when it's too cloudy to see the stars, visitors examine the 26-inch telescope instead, an impressive sight at 30 feet long. To reach it, they must ride Washington's largest elevator: the entire floor rises and falls inside the observatory's 40-foot-wide dome. It's cold in the dome in winter, and warm in summer, because air currents that distort the view are created if the temperature is not the same inside and out.

This scope is the one with which Asaph Hall discovered the moons of Mars, Deimos and Phobos, in 1877. It is so precise that it is still used for measuring binary, or double, stars. Many measurements for the *Washington Double Star Catalogue*—a database that goes back over a century—were made with this instrument.

Not so long ago this data was collected the hard way, with repeated observations and notes penciled in by hand. Now, with a camera that videotapes a star area 30 times a second, and computers that interpret the data, we can fix the parameters of binary stars and determine orbit and mass in a matter of minutes. It is this function—finding the position of objects in the sky with maximum exactness, plus determining time with great precision—that is the task of the Naval Observatory.

We looked at the little meridian transit scope with a 6-inch aperture. This one is fixed on a north-south axis and measures the east-to-west movement of the stars as they cross one specific meridian. "It's probably the most accurate anywhere, said Chester, and was used for a century, until it was superseded two years ago by more sophisticated instruments."

The observatory has compiled the world's largest star catalogue, with half a billion entries contained on ten CD-ROMs. Knowing the position of stars is especially useful if, for example, you're monitoring a new celestial satellite for which you haven't been given the orbit. You need a bunch of star positions as the background against which you can work out its path.

Now we are looking at the Master Clock of the United States, accurate to a billionth of a second per day, with a roomful of computers across the hall to serve as a backup. We can get extremely accurate time by measuring the earth's rotation and breaking it down into fractions of a second. Because the earth is slowing down, every 500 days or so we declare a leap second to make up for the lag.

For those who do not need to consider the earth's rotation to measure time, cesium beams and hydrogen maser clocks, or "atomic" clocks, give us an almost perfect reading.

Chester has loved stars since he was 7 years old and saw Willy Ley's book *The Conquest of Space* with Chesley Bonestell's great illustrations of the planets.

"For the past ten years," he said, "I've been doing summer stargazing programs for the public out at Sky Meadows State Park near Paris, Virginia, 50 miles from Washington, D.C. That's how far out of town you have to go to see stars."

On the other hand, as instructor Richard Schmidt pointed out, for his Smithsonian Associates classes the city starscape will do well enough for instruction. There is always something to look at, a nearby planet or a constellation. There are star maps to study and slides that show what you can't see if it's cloudy.

Believe it or not, you can have too many stars up there if you're trying to point out the important ones, Schmidt said. A whole skyful of stars can be bewildering.

Bewildering but, as my grandson says, awesome.

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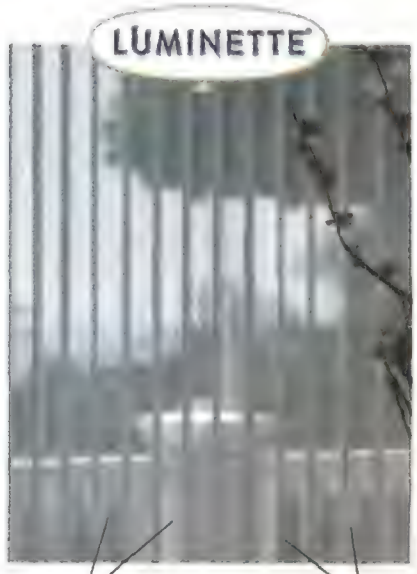

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THE OBJECT

AT HAND

Steaming into the Future

AN UNGAINLY MONSTER, THE STEAM TRACTION ENGINE HELPED TURN THE BUFFALO'S PASTURE INTO AMERICA'S BREADBASKET

BY DIOTIMA BOORAEM

At 16 feet long and weighing nearly ten tons, the 1920 Huber was just average size.

BUILT TO LAST AND AS BIG AS A dinosaur, it was obsolete before it left the factory in 1920. Nonetheless, with huge wheels and a gay canopy with a red fringe on top, the Huber "steam traction engine" is a splendid relic of expansionist 19th- and early 20th-century America. It was steam traction engines pulling plows and powering threshing machines that completed the taming of the Great Plains. Chuffing and clanking, they turned the buffalo's pasture into America's breadbasket, allowing people to put down roots on lands that, till then, were reckoned difficult, if not impossible, to farm.

The object at hand sits in the National Museum of American History not far from a 1924 John Deere Model D internal-combustion tractor (the kind of machine that the word "tractor" was actually invented for). By the early 1920s gas and kerosene internal-combustion machines like the Deere had all but won the race for the farmer's dollar. Yet America's romance with steam did not die easily. Steam had powered the Industrial Revolution, after all, and the whistle of steam engines had fired many a young man's imagination. Quite a few would realize a childhood dream of becoming a custom thresherman, traveling a territory with a big machine that threshed and later plowed for farmers who could not afford to own one themselves.

The seasonal arrival of the threshermen set off a great flurry of excitement and backbreaking work, and a great communal feast of home-cooked food. Men and machines traveled from farm to farm, plowing in the spring, threshing each fall. For several decades, they were an institution in rural America, their steam traction engines, like noisy, friendly monsters, objects of awe and wonder.

Such engines were truly huge. Some weighed more than 20 tons. At almost 10 tons and 16 feet long, the Huber is just average. The biggest models were used almost exclusively where the soil—under grass for centuries—was hellishly hard to break up with any plow pushed by hand or pulled by horses. The soils and climate of the Western states were suited to growing grain, but that was profitable only when the grain was produced on a large scale, and it needed enormous labor to harvest. The flat, open land was forgiving of the great machines' size and clumsiness.

Often with prairie farmers in mind, American inventors and manufacturers in the 1800s created a truly phenomenal number of ingenious machines for agriculture. From 1790, when the first patent law was passed, to 1899, more than 40,000 patents for farm implements were registered.

But well past mid-century the source of power was still primarily

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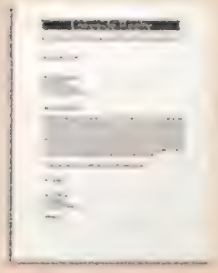

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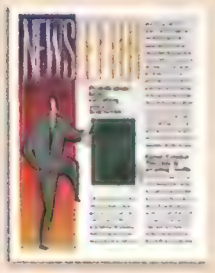

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horses or oxen. Teams of up to 40 horses, hitched to enormous plows and harvesters, worked the ever-expanding fields of the West. To keep a horse requires about five acres of land per horse. Horses need a lot of care. They cannot pull without harnesses, and harnesses need to be maintained. During a workday, teams had to be changed at least once for rest, and often two or three times. Inventors kept working to improve steam power on the land, especially for use with heavy harvesting machinery.

After the Civil War, portable steam engines really got into the threshing process, though they had to be towed to the already harvested grain by horses. It was not until the 1870s that the first functional self-propelled steam tractors began to be built in quantity. Not yet up to the demands of plowing, they were used at first primarily for threshing. But by the 1890s Bessemer steel and stronger gears had made it possible for the huge new machines to plow up to 75 acres a day. Moving them from farm to farm caused quite a stir. Horses tended to bolt whenever they saw one. In 1897 an Ohio newspaper reported that one Aaron Emick's horse and buggy ran away after meeting a traction engine. "Mr. Emick was thrown out and a barrel of apples and other articles in the buggy were scattered along the road. The horse and buggy went on to town and collided with an electric light post."

It is easy to sympathize with the horses. The machines sometimes clanked and rumbled, belching smoke and cinders as they moved along at two or three miles per hour. Some states required that they be dragged by horses when on public roads so they wouldn't scare oncoming horses. Such laws did not please steam tractor operators. In 1900 the *Thresher-men's Review* noted tartly that "the average state congressman knows about as much of running a traction engine as a hog does of teaching Sunday school."

Before steam traction engines, teams of animals did all the heavy hauling.

Sparks from steam engines often set fire to the straw almost always nearby during threshing. Because steam engines operated under great pressure, they needed constant and knowledgeable attention. The fire in the firebox had to be fed the right amount of fuel (coal, wood or straw); the water level in the boiler had to be watched, or the boiler might explode. In 1911, it was said, boiler explosions averaged two a day. "The noise was deafening and the effect awful," the *Ashland* [Ohio] *Press* reported after one explosion. "A huge cloud of dirt and steam enveloped everything. . . . The huge engine and boiler was lifted 20 feet from where it stood while parts were scattered everywhere." The engineer was blown 142 feet.

Despite such accidents, by 1900 some 5,000 large steam traction engines a year were being made. But the steady improvement of internal-combustion engines threatened their existence. Charles Hart and Charles Parr, often considered to be the fathers of the gasoline tractor industry, built their first tractor model in 1902. The internal-combustion tractors tended to be smaller, lighter and able to run all day on a tank of fuel. There were no fires to build, and operators did not constantly have to replenish the thirsty machines' supply of water. By 1920, there were 166 tractor companies together turning out more than 200,000 tractors each year; the production of steam traction engines had dwindled to almost nothing.

The Smithsonian's Huber didn't find a buyer until 1930, and judging by its condition, saw only light work, probably powering a drivebelt at a sawmill. Many steam engines made in the 1920s were fitted with broad wheels for building roads, which is how the word "steamroller" entered the language. Huber built its last steam traction engine, a steamroller, in 1927.

The romance of steam traction engines still hasn't quite died, however. Hundreds of the old behemoths have been restored and maintained by the usual legion of hobbyists, who hold national conclaves and demonstrations where the machines are lovingly fired up again to lumber and majestically snort their way around. At such events, it is still advisable to leave your horse at home.

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SMITHSONIAN HIGHLIGHTS

A Mailbox with a Catch

RECENTLY A MAILBOX IN MAINE was carefully packed up by a fine-arts shipping firm and trucked to Washington, D.C. "We certainly consider it a work of art," says Phyllis Reed. "Kenneth has done a lot of woodwork but has never gotten recognition." Last spring she encouraged her husband to enter the National Postal Museum's Artful Mailbox Contest, a tribute to creativity in rural America. "I was just hoping he might be one of the top ten." Kenneth's creation shows different levels of the sea from a Mainer's perspective: an old-style wooden lobster trap decorated with aluminum starfish holds the regulation mailbox; a metal mobile of fish and sea horses floats above; the buoy marks the location of the trap; the yellow-slickered fisherman waits patiently. Instead of the usual red flag, a lobster claw signals that there's mail to be picked up. It all stands more than six feet tall and weighs about 125 pounds. This winning mailbox and photographs of the ten runners-up will be on display at the museum through December. Five of the pictures can be seen at smithsonianmag.si.edu. The Reeds have no plans to visit their mailbox in Washington. "But we hope our grandson will go." — *Laura Gonzales*

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SMITHSONIAN HIGHLIGHTS

Imperial Everest

Jan Morris, who accompanied the 1953 British Mount Everest expedition for the *Times* of London and broke the story of the first ascent, has written more than 20 books about the cultural and social history of places around the world. She will speak about Britain's expeditions to the mountain in the context of its former empire in Asia. September 17, 6:30 P.M., Meyer Auditorium, Freer Gallery of Art. For information on this lecture and other programs at the Sackler and Freer galleries, call 202-357-2700 or visit www.si.edu/asia.

Magazine Website

SMITHSONIANMAG.SI.EDU

Another place to start finding out about the many exhibitions, events, publications and activities of the Smithsonian is smithsonianmag.si.edu. There you'll find a version of the *Highlights Calendar* with links to the many pages of the Smithsonian Institution Website.

Exhibitions, Events

ARTHUR M. SACKLER GALLERY

The Buddha's Art of Healing: Tibetan Medical Paintings from Buryatia (through January 3, 1999) Seventeen paintings from the only surviving copy of an extraordinary treatise on Tibetan medical knowledge.

FREER GALLERY OF ART

Whistler and the Leylands (through June 30, 1999) Etchings and drypoints made by James McNeill Whistler between 1867 and 1875, when his art was thriving under the patronage of Frederick Richards Leyland.

NATIONAL MUSEUM OF AMERICAN ART
RENWICK GALLERY

Daniel Brush: Gold Without Boundaries (September 11 – January 10, 1999) The first exhibition to showcase the artist's unparalleled jewels, precious objects and sculptures. See SMITHSONIAN, August 1998.
The Stonewares of Charles Fergus Binns: The Father of American Studio Ceramics (September 11 – January 3, 1999) Sixty elegant, Chinese-inspired stoneware vases, bottles, bowls and jars, dating from 1888 to 1943.

NATIONAL PORTRAIT GALLERY

Recent Acquisitions (through January 24) Works by such artists as Henry Inman, Elaine de Kooning, Jamie Wyeth, and Jacob Lawrence, and two photographs of Marilyn Monroe by David Geary, taken when she visited Korea in 1954.
Andy Warhol's Flash—November 22 (September 18 – November 29) The artist's 14-print portfolio, with words from the popular press, about the Kennedy assassination.
Latino Film Festival (September 15 – October 13) Works in celebration of Hispanic Heritage Month, focusing on regions of the United States.

COOPER-HEWITT, NATIONAL DESIGN MUSEUM
[NEW YORK CITY]

Fountains: Splash and Spectacle (through October 11) Inventive designs dating from the Renaissance to the present.
Under the Sun: An Outdoor Exhibition of Light (through October 25) The power of the sun as a catalyst for design, featuring solar and solar-electric products, prototypes, commissioned designs—from sundials to solar collectors and more. See www.si.edu/ndm.

NATIONAL AIR AND SPACE MUSEUM

¡Arriba! The History of Flight in Mexico, Central America, South America, and the Caribbean (through November 30)
Star Wars: The Magic of Myth (through January 31, 1999) For information on limited free same-day passes, call 202-786-2122. Advance tickets can be purchased through ProTix (800-529-2440).

NATIONAL MUSEUM OF NATURAL HISTORY

Janet Annenberg Hooker Hall of Geology, Gems and Minerals Spectacular gallery showcases the National Gem Collection and takes visitors from the depths of a copper mine to the far reaches of the Solar System.

Planning a Smithsonian Visit?

THE CASTLE—INFORMATION CENTER

Begin your visit at the Smithsonian Information Center's Associates' Reception Desk—open 9 A.M. - 4 P.M. daily—in the Castle. Special materials and information on exhibitions, activities and dining await you there. Learn what's new at the Smithsonian and other capital attractions—videos, touch screens, maps and more.

Smithsonian museums are generally open 10 A.M.-5:30 P.M. daily, except December 25. Receive a free Associates' planning packet. Write to Smithsonian Information, Smithsonian Institution, Washington, D.C. 20560, or call 202-357-2700 (voice) or 202-357-1729 (TTY), 9 A.M.-5 P.M., Monday-Friday; 10 A.M.-4 P.M., Saturday-Sunday. Note: Parking is limited; Metrorail (subway) is convenient to all museums.

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Amazonia The world's largest rain forest and river habitat.
Pollinarium Means of reproduction—living plants, hummingbirds, butterflies and a colony of bees.
Think Tank The biology and evolution of animal thinking, with a focus on orangutans.

ARTS AND INDUSTRIES BUILDING

Speak to My Heart: African American Communities of Faith and Contemporary Society The role of the black church.
Resonant Forms: Contemporary African American Women Sculptors and *Three Generations of African American Women Sculptors: A Study in Paradox* (both through September 30)
Discovery Theater Live theater for young audiences. For information, call 202-357-1500 (voice or TTY) weekdays, 8 A.M.- 4 P.M.

NATIONAL MUSEUM OF AFRICAN ART

African Design and the Furniture of Pierre Legrain (through November 29) The influence of African chairs and stools on the work of French Art Deco designer Pierre Legrain.
Images of Power and Identity More than 100 works from the collection.
The Ancient Nubian City of Kerma, 2500-1500 B.C. Forty works from the permanent collection of the Boston Museum of Fine Arts, celebrating Kerma, the capital of the kingdom known to the Egyptians as Kush.
Sokari Douglas Camp: Three Sculptures Works by the Nigerian artist (b. 1958–) are featured in the museum's pavilion. Two sculptures are kinetic and are timed to perform at 15 and 45 minutes past the hour during museum hours.

In gratitude for a safe ascent of Everest, Jamling Tenzing Norgay sponsored 25,000 butter lamps at Bodhnath Stupa in Kathmandu. The Imax film EVEREST is at NASM.

The Ancient West African City of Benin, A.D. 1300-1897 The museum's collection from the royal court of the capital of the kingdom of Benin as it existed before British colonial rule.

NATIONAL MUSEUM OF AMERICAN HISTORY

A Collector's Vision of Puerto Rico (through January 1999) Items from Teodoro Vidal's 3,200-object collection. Costumes, jewelry, carnival masks and other items.
Between a Rock and a Hard Place: A History of American Sweatshops, 1820-Present (through October 30)
Science in American Life Displays on advances in science over the past 125 years, and a hands-on science center.
American Encounters Cultures of New Mexico's Upper Rio Grande Valley.
Information Age: People, Information and Technology The 150-year history of information technology.

EXHIBITION CATALOGUES

Catalogues available currently include:
Daniel Brush: Gold Without Boundaries ($65 cloth)
Charles Fergus Binns: The Father of American Studio Ceramics ($50 cloth)
Three Generations of African American Women Sculptors ($24.95 paper)
Blue Guitar ($19.95 paper)
Stuart Davis ($35 paper)
The Art of Being Kuna: Layers of Meaning Among the Kuna of Panama ($35 paper)
To order, send check or money order to Smithsonian Museum Shops, 8308 Cinder Bed Road, Lorton, Virginia 22079. Include 15 percent of purchase for shipping (minimum $4.50).

SMITHSONIAN PRODUCTIONS

Visit Smithsonian Productions' Website for information about their public radio programs and video products: www.si.edu/sp. Currently being broadcast is "Jazz Smithsonian," featuring classic American jazz, with host Lena Horne and the Smithsonian Jazz Masterworks Orchestra, which performs music of the 1920s through the 1960s. Check public radio listings in your area.

SMITHSONIAN INSTITUTION TRAVELING EXHIBITION SERVICE

SITES circulates exhibitions of all shapes and sizes on the arts, sciences and humanities to more than 250 venues each year. To sponsor a show in your community, write to: SITES, Smithsonian Institution, Washington, D.C. 20560. A listing of current exhibitions and additional information is available at www.si.edu/sites. The site includes a map so you can easily see what exhibitions will be coming to your area.

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DES GROSELLIERS

The long, cold journey of

ICE STATION SHEBA

Climate scientists go with the floe

BY HOLLY MENINO ⁜ PHOTOGRAPHS BY JAMES H. BARKER

THE ICEBREAKER IS HEADED JUST A COUPLE OF DEGREES off due north. Except for the faint geometry of cracks and pressure ridges, the snow-covered icescape around it is a dazzling plain that spreads to meet a pale sky. The French-Canadian officers aboard the *Des Groseilliers* go about their routine duties, telephones ring and crew members report in by radio—all the usual activity of a ship at sea. Except that this ship is locked in ice nine feet thick. It is now April. Since last October, she has been frozen into an Arctic ice floe, which is now about 400 miles north of both North America and Asia.

In early 1997, Canada agreed to provide an icebreaker as a floating base for a large-scale international project of the U.S. National Science Foundation and other agencies to study heat fluctuations in the Arctic, officially known as the Surface Heat Budget of the Arctic Ocean, or Ice Station SHEBA. The *Des Groseilliers* is the first ship intentionally set adrift for a year with the Arctic ice pack since the Norwegian vessel *Fram* locked into it a century ago.

To get to SHEBA from Barrow, Alaska, you have to fly northwest over the ice for two and a half hours. When the ice station first comes into view, the 300-foot-long ship and the scattering of research huts flung out around it look like ants on a hill in a pristine white desert.

The *Des Groseilliers* is action central. Its steep gangplank gets a lot of traffic. At any given moment some of the 35 or so scientists and technicians or members of the logistics squad and ship's crew are likely to thump aboard or emerge on deck in the breathtaking cold wearing superheavy parkas and overalls, carrying radios, rifles, scientific equipment. They go through the polar-bear-proof cage at the end of the gangplank and take one of the snowmobiles parked in the "lot" or head out on foot for research sites. Most of the sites are within a half-mile of the ship, and the farthest, called Baltimore, is only three miles away. The researchers have named

In "Blue Bio," a cramped lab perched on the ice, chemist Harold Welch uses a pipette to test a sea sample for nutrients.

the sites according to whim, many in honor of the hometowns of baseball teams. Atlanta and Pittsburgh are dedicated to hypersensitive gauges for measuring surface wind, temperature and humidity, while over at Ocean City, the Yo-Yo, a winch the size of a tractor tire, is plumbing the depths by lowering a cable into the icy sea. A half-mile above the icebreaker, the winds buffet a small orange blimp. Just a few yards from the ship, at the station known as Blue Bio, two or three times a week a young man in a diving suit with two layers of long johns, 130 pounds of tank apparatus, and a lot of nerve disappears through a hole in the ice.

Properly measured and studied, scientists believe, this ten-mile-long ice floe may hold part of the answer to one of the hottest issues of our time—the matter of global climate change and whether what appears to be global warming is a steady and potentially disastrous trend. There is no question that the Arctic exerts a powerful influence on the earth's climate; every year more than half the ice pack melts and then refreezes. Not much is known, however, about what actually takes place during these transformations. Scientists don't know whether increases in Arctic temperatures are a response to human activities, such as the burning of fossil fuels, or are mainly natural occurrences. Most of the long-term and often contradictory predictions about climate are based on models that don't account in detail for the Arctic.

For an ongoing chart of changing conditions on the floe, Matthew Sturm takes a temperature reading at the interface between the sea ice and the snow cover.

"We didn't have good numbers," Don Perovich says of past calculations. He is on his way out to have a look at the ice at Pittsburgh and Seattle, hauling a sled full of optical instruments and computers. Also a radio and a rifle. The radio is to keep in touch with the ship in case snow or fog moves in or someone gets stranded on breakaway ice. The rifle is for polar bears. No one travels unarmed or alone beyond the immediate vicinity of the ship.

Perovich is based at the U.S. Army's Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire. In addition to carrying out his own research, as chief scientist at SHEBA he uses his playful wit to keep the weekly science meetings on board at just the right degree of intensity. He and the other scientists are measuring heat and the way it moves around the ice floe, and that is mostly what they talk about. But it takes some mental gymnastics to contemplate heat up here. Even in April when the temperatures are

warming way up to −15 degrees Fahrenheit, the cold is so brutal that common adjectives—like "chilly," "frigid," "freezing"—are hopeless. Beards and mustaches freeze nearly solid with breath and mucus. Fingers stiffen; tools fall easily from the hand.

Seen from the icebreaker's bridge, the people working at the research sites seem to plod along in slow motion. "No one runs in the Arctic," says Perovich. Bulky clothing makes you clumsy. The snow is punchy underfoot, and because the floe is a kind of jigsaw puzzle floating on the ocean, cracks and ridges slow you down. It is easy to take an unsuspecting step and go in up to your thigh. When ice plates jam together, the pressure ridges push up like colliding continents. In the heaved-up chunks you can see that the ice is a deep aqua color.

Perovich arrives at Pittsburgh, a place distinguished by a line of stakes stuck in the ice and an orange trunk that looks like it might hold sound gear for a rock 'n' roll band but in fact is crammed with data-logging equipment. Buried in the snow at the base of each stake is a wire that runs through the ice to the ocean. It's part of a rudimentary device to measure ice thickness. As the ice grows, it pulls the wire down with it, shortening the length of wire that remains above. Perovich uses gauges like this to measure ice growth.

He pulls up a wire, holds its end against the tape measure and considers the contraption with amusement. "Cutting edge technology," he grins. "Nineteen-fifties-style." His optical equipment is more sophisticated. It measures the ice's capacity to reflect and absorb light and heat from the sun, and can even record the reflective properties of a pinpoint of ice. He takes ice growth and optics measurements every five yards at each site and, like a trapper running a trapline, checks each site two or three days a week. The numbers accumulate.

A helium balloon, unwinding on a 8,200-foot cable, carries aloft a tiny video camera and particle sensors to monitor the microphysics of clouds.

The ship's gangplank is two stories high, leading to an oval door that opens with a heavy vault mechanism. Scientists returning from the ice emerge into warmth and safety. The *Des Groseilliers*'s living and working spaces are warm and clean, not unlike a decent but inexpensive hotel.

According to a count made about halfway through the year by the ship's captain, René Turenne, more than 160 scientists and technicians, in fields ranging from pure physics and electrical engineering to oceanography and biology, have come aboard to take the measurements of the floe. SHEBA is an immense undertaking, the largest Arctic project ever initiated by the NSF. The foundation provided the basic funding of $16.5 million—$14 million for the ice camp phase—and other money came from the U.S. Office of Naval Research. Support for the university- and lab-based research teams was provided by the National Oceanic and Atmospheric Administration and the U.S. Department of Energy. In addition to Americans, there have been scientists from Canada, Japan and Russia. Only a few of the researchers have much experience in the polar regions.

Physicist Richard Moritz heads up the SHEBA project office at the University of Washington and coordinates arrangements for the 17 research projects at the ice station. He has an encyclopedic command of the history of climate research and works at his own research in a place between

decks, called the Static Inverter Room. To get there, you walk back along a series of catwalks through a two-story cavern that houses huge pipes. The place is as hot as a sauna and pervaded by an intense electrical hum.

"I'm running the project, so I could choose any place I wanted for my research," Moritz says. "I like it here." One reason Moritz chose the Static Inverter Room is that its back door opens directly to the helicopter deck, where helium balloons are launched. They are just like the birthday party kind except that they carry a payload of sensors to test wind, temperature, pressure and humidity, and a radio to transmit these readings. The package is the size of a box of instant cake mix and weighs only a half-pound. To send one aloft, Moritz just takes a few steps across the deck and ducks into the shelter of a shipping container that holds a tank of helium. In a few seconds he has attached the instrument package, filled the balloon and released it to the wind. Before it clears the ship's smokestack, he's on his way back into the heat and hum of his lair. It's a shock to step from the stifling heat into the Arctic wind, and he's clad in a T-shirt and sandals.

He begins with an imaginary slice taken from the stratosphere down through the ice to the water below. "That's the 'column' we all talk about." Air, ice, ocean.

Radio signals from the latest balloon show up on Moritz's computer monitor. The blips climb up the computer screen and lead Moritz into an explanation of the way energy is transferred around the atmosphere, the ice and the ocean. He begins with an imaginary slice taken from the stratosphere down through the ice to the water below. "That's the 'column' we all talk about." Air, ice, ocean. He illustrates key points with equations made in a minute hand on a small slip of notepaper. "The ice is white, so it reflects, right? The ocean is black—well, almost—so it absorbs radiation." These statements occasion a scattering of equations, and he continues on until he has accounted for the flow of energy from air to ice to ocean and the scrap of paper is filled on both sides with equations.

"Way oversimplified," he says to excuse the math, but he has outlined a primitive model of the machinery of climate. His description lacks crucial numbers, but then so do the most sophisticated models of global climate. Making the description accurate is a matter of getting the right numbers. In fact SHEBA is a kind of paint-by-numbers project, and ideally, after the *Des Groseilliers* steams away for good, it should finally be possible for scientists to create a more accurate model of the air-ice-sea column as well as more reliable long-term predictions about climate (the aim of the whole SHEBA project).

The Norwegian Fridtjof Nansen was one of the early contributors to our understanding of the column. When he sent the *Fram* into the ice above the New Siberian Islands in 1893, his aim was to reach the North Pole, but the expedition's actual discoveries were in the field of oceanography. The drift of debris from the U.S. vessel *Jeannette*'s disastrous attempt to cross the Arctic Ocean (SMITHSONIAN, March 1997) had convinced Nansen that he could enlist the ice pack's seasonal movement to carry his ship close enough to the top of the world to reach the pole by foot. Meanwhile Otto Svederup, the *Fram*'s captain, and his crew would record observations of ocean depth and currents, and atmospheric and astronomical events.

Nansen drifted with the ship for 18 months, then disembarked to make a rush on foot for the pole. Svederup stayed with the *Fram* and continued his observations of its drift. Nansen failed to reach the pole. But when the *Fram* finally got home, it was carrying important new information about the geography of the Arctic and seasonal changes in the ice pack.

What were almost incidental investigations for the *Fram* crew have now become critical explorations related to

Relocating one of the project's portable climate-monitoring stations, scientists walk it a hundred yards across the ice from "Pittsburgh" to "Seattle."

the durability of the planet. In the most dire scenario anticipated by today's models of climate change—what some scientists refer to as the "drop dead" scenario—the Arctic ice pack melts, and drastic changes in the temperature and salinity of the oceans ensue, upsetting the ecological balance of the world. But such scenarios are still speculative because they do not account for the complex interaction between such things as warm winds from the south, variations in cloud cover, and differences in the amount of sunlight reflected from snow, ice and open water. Scientists view all of this as a feedback loop. The net result may prove to be a warming—or a cooling—of the climate in this crucial weather area, and perhaps the world. When the Sunday evening science meeting convenes, no one speaks to the enormous question of whether the earth's climate is warming. "Everyone here probably has a private opinion about that," Moritz explains, "but we have to put it aside to do the science." Don Perovich passes around a bag of M&Ms, and the researchers share bits of information that emerged during the week.

One of the early findings from the station has been that ocean water under the floe is fresher and less salty than it was under the ice 20 years earlier. This would tend to confirm the melting, the shrinking of the ice cap that many climate models have predicted. But, Moritz points out, "it could just as easily be a product of El Niño. We came into the year with the advice that El Niño probably wouldn't affect things that much up here. Now the El Niño guys seem to want to change their minds. We just don't know."

"I see myself as a number producer," says Roger Andersen, a veteran of more than 20 trips to the Arctic. "My job is not to worry about where the number fits in. I worry about whether or not it's a good number."

Twice a day he heads out to the huts occupied by oceanographers from the University of Washington, the Naval Postgraduate School and the Lamont-Doherty Earth Observatory. The winch called the Yo-Yo, commanded by software that Andersen wrote, rolls forward, then back, and the cable runs down through a hole in the ice. At the end of the cable, on its way down to 450 feet and back, is a device that measures water temperature, salinity and pressure. Readings are transmitted to a computer on a table next to the melt hole. Yo-Yo usually runs two four-hour sessions a day, sending 4 readings an hour, 32 readings a day. In the smaller hut next door, clusters of meters register changes in the speed of water currents and in water temperature, which control heat exchange between the ocean and the ice.

As the days pass, with gray weather and the absence of dawn and dusk, aboard the *Des Groseilliers* it is regular mealtimes that give order to the day. "Eat as much as you can whenever you can" is one Arctic veteran's rule of thumb, and every day the ship's chef and pastry cook turn out an abundance of temptations. Apparently, great food is an ice camp tradition; one of the men on the logistics squad recalls an expedition that recruited a

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former White House chef for the galley. Meals bring comfort and conversation. People at the ice station speak of participating in a once-in-a-lifetime event, which is certainly true. The NSF project has brought together many people who through the ordinary transaction of business in science would never have made such close contact, and who are not likely ever to have another chance to work at the same time in the same place with researchers from so many different disciplines.

The chance for a berth on the ice station caused a number of scientists in training to make sudden detours in their studies. Cara-Lyn Lappen (p. 50) was working toward a doctorate in atmospheric science that would give her credentials as a climate modeler. No one would have told her to spend time in the hands-on gathering of data, but she came to SHEBA with a cabinful of tools, power drills, wrenches, soldering implements. "Hey, it's soul-building," she says. "Anything you do that's real is soul-building."

At many meals, the names of famous Arctic explorers come up—Peary and Cook, Scott and Amundsen—and debate resumes over the races for the poles and the details of the famous crossings. Don Perovich recalls that he was propelled into Arctic research by a professor who handed him *Endurance,* Alfred Lansing's tale of Ernest Shackleton's struggle to reach the South Pole, and said, "Read this. It will change your life."

Matt Sturm, of the Army's Cold Regions Research and Engineering Laboratory, first caught a whiff of polar romance as a 17-year-old on a U.S. Coast Guard cutter off Antarctica. He speaks of Nansen and his sidekick Hjalmar Johansen with some wistfulness and feels that he has missed the age of big-time Arctic exploration. The challenges he now faces are of a different order, but they take him into the wilderness to work where he wants most to be. "For a guy in my time," he says, "I have been amazingly lucky."

A diver gets a hand up after an hour of collecting sample organisms from the underside of 1½-foot-thick ice with a tiny vacuum cleaner.

"All these guys are into toys!" laughs Taneil Uttal. A diminutive, gregarious woman from Boulder, Colorado, she acts as radar specialist. From her perch in the tall lookout chair on the bridge she can survey the activity at the research sites near the ship. "They *love* their toys. Just look." Way out at Atlanta to the northeast, a snowmobile is hauling a sled assembled by Jim Maslanik, an aerospace engineer, also from Boulder. A plywood box fitted with aluminum brackets for radiometers and other sensors sits on the sled, which looks very much like a Soap Box Derby entry. The intention is to make a continuous recording of the surface reflectivity on a fairly large tract on the floe.

Closer to the ship, Matt Sturm takes measurements for an intensely detailed map of the floe's snow cover, which insulates the ice. Sturm is small and dark; his partner Jon Holmgren, a mechanical wizard, tall and blond.

In order to make all of the thousands of depth measurements necessary, Holmgren created a computerized wand that looks like an oversize ski pole with a trigger mounted in the grip. Plunge the pole through the snow to the ice, and a disk on the pole slides up. Click the trigger, and the distance is measured and recorded.

Still another of the scientists' toys flies gaily over the ship's stern. It's a balloon, a fluorescent orange scale model of the Goodyear blimp, tethered by a thin cable. A team from the University of Alaska led by Knut Stamnes uses it to examine the clouds over the pack ice. Clouds are, literally and figuratively, a gray area in Arctic research, the mystery layer in the air-ice-sea column. They both filter

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solar energy and hold that energy close to the earth.

Its unwinding leash gives the little blimp a range of about 8,200 feet, allowing it to carry instruments into the clouds above the ship, then transmit back to Stamnes' team in the Pumpkin, a corrugated metal building the same orange as the balloon. Packed in with their computers and thick parkas, they're capturing the signals from the blimp's proudest cargo, a "cloud videometer," a gadget regarded with great interest by all the scientists aboard. "It lets you see the individual ice particles or droplets in a cloud," Stamnes proudly explains. "Each one."

Until recently weather experts have detected the presence of clouds the same way everybody else does, by looking at the sky. For a researcher like Uttal, there are more sophisticated ways of searching out clouds. This is the reason she enjoys command of the biggest toys of anyone at the ice station, the radar and lidar (Light Detection and Ranging) installations, two inscrutable sheet-metal boxes that sense the location and composition of clouds. She also coordinates the flights of research planes over the floe. They sample the atmosphere from the top down. She seems to relish the logistical hassles of aircraft deployment, satellite overpass and data interpretation. "You may not think you saw a cloud," she admonishes her colleagues gleefully, "but *we* did. Here's a term for you—it's not a cloud, it's a 'radar-reflecting boundary.'"

The plan is for the *Des Groseilliers* to stay in the ice for a full year, until this fall, so that the scientists can gather numbers through all four seasons. But this plan has been threatened by the ice itself. Throughout the dark season, when temperatures remain between −40 F and −20 F, all is quiet. During the warm months, depressions in the ice become melt ponds. In time, the ponds bottom out and become holes.

By April, the ice is more volatile; it heaves and cracks, jams and comes apart. The shifting of the huge ice plates brings tremendous pressures to bear on the *Des Groseilliers*'s steel hull. The icebreaker's defense against being crushed is not simply in its strength, but in its design, virtually the same one used by the builders of the *Fram* in the 19th century. When Nansen commissioned the *Fram*, he specified that the sides of the hull should slope sharply inward toward the keel so that she would slip "like an eel out of the embraces of the ice." The *Des Groseilliers* slides up over the ice, while the pressing ice creaks and clunks and occasionally cracks explosively.

Spring temperatures have crumbled the existing runway used by the sturdy, prop-driven Twin Otters that shuttle back and forth between the ice station and Prudhoe Bay or Barrow. A bulldozer is working on a new one. The man running it is New Zealander John Bitters. For nearly 30 years he's worked in ice camps in both polar regions and Greenland, but he never seems to feel the cold. "Cover the schnoz," he orders a visitor, and the balaclava is adjusted immediately. Bitters' job is logistics, which means everything from deciding where planes will land to handling the diplomatic hassles of giving out snowmobile keys to scientists.

During one upheaval he was using the bulldozer to rescue a cargo container about to slip into a yawning crack that had suddenly opened in the ice. The operation took only a few minutes, but when he was done, he looked up to find the crack between him and the ship widening. This was scary, but he was able to gun the bulldozer and cross back quickly. "These things can happen fast," he says. Part of his job is to stay ahead of the ice, patching cracks with snow, moving huts and equipment from risky areas. When he heads back up the gangplank, he always leaves the bulldozer running. The bulldozer is tricky to start at these temperatures, so night or day you always hear it chugging gently in the background, ready when needed.

Ten days into April, just after 2 A.M., there is a loud report off to star-

Inside the "Pumpkin," data central for cloud sensors, Cara-Lyn Lappen and a colleague discuss new readings.

board. Researchers scramble up to the bridge. There is enough light for them to see that no new cracks have opened the ice to the ocean and that the research sites have stayed put—so far. A day or so later, the temperature rises to an all but tropical 20 degrees F. The wind drops; the current dies. Out at Baltimore, the most remote

"My job is not to worry about where the number fits in. I worry about whether or not it's a good number."

site on the floe, Ola Persson's portable meteorological station is on the fritz. "These things are a pain," says engineer John Militzer; he is resigned to coaxing the portable instruments to deliver numbers for Persson. "Trip out to Baltimore today—want to go?"

Only Persson and Militzer are needed to make the repairs, but the ban on solo travel encourages group ventures, and others who are taking data from Baltimore join up to visit the site. The expedition forms in the parking lot, a party of nine riding five snowmobiles with sleds. One sled carries people sitting with their legs out in front of them like kids on a toboggan.

Although Baltimore is only about three miles from the ship, Bitters and a colleague go along as guides, and the journey takes nearly two hours. New cracks and pressure ridges have formed since the last visit to Baltimore a couple of weeks ago. Every few hundred feet, the snowmobiles have to stop. Bitters and others walk around the edges of cracks and prod piles of ice with poles to see if the snowmobiles can get over. Sometimes the shovels come out and everybody takes a turn clearing the impasse. It's also a way to keep warm. "Dogs wouldn't have a problem with a ridge like this," Bitters declares. He recalls one special dog, a big male with an uncanny instinct for locating weak ice, and rues the day when the ice camps stopped using sled dogs.

Soon the machines are slowly grinding over the new pass, and the procession moves ahead. In fits and starts it traces a labyrinthine course out from the icebreaker.

At Baltimore, Militzer's simple repair—the replacement of a thermogenerator in a huge white trunk full of data loggers—takes another two hours. While Militzer tinkers, Don Perovich checks his ice-thickness gauges, and Matt Sturm and Jon Holmgren move across the snow with the ski pole gizmo, punching in every half-meter like a needle taking stitches. They finish before Militzer has the thermogenerator running, and they come to stand with Persson by his meteorological equipment. "Yes, I do," Militzer agrees with Bitters. "I talk to myself." It's a way to keep himself on track. People up here like to joke about the "dreaded Arctic brain fuzz," but it is a fact that the mind, as well as the body, slows down in extreme cold.

We are out of sight of the ship. For the first time in weeks there is no red hull in the picture. But it won't get dark, because it doesn't get dark now, and the snowmobiles have left waggling tracks that lead back to warm quarters. Everybody except Militzer shifts in place to keep warm.

"Now," he asks himself, "what did you do with that little nut? You just had the thing in your hand!" He struggles to turn the nut, and finally takes off his glove and works rapidly. The others move around, fighting the cold, and when the generator starts, Miltizer holds his hand over the heat. The afternoon's jaunt, like the ice station itself, is a carefully controlled venture on the ice. But without the presence of the ship, the cold is real, the pack ice vast and the human beings standing around the instrument trunk very small.

Holly Menino contributes to Ocean Report, *aired on many public radio stations. James H. Barker specializes in photographing people who live and work in high latitudes.*

After years of abuse and neglect, Thailand's elephants are in

Big Trouble

BY ANTHONY MECIR

PHOTOGRAPHS BY MICHAEL FREEMAN

LEN HOMHUAN IS AN OLD MAN, but when he was young he ventured into the seemingly boundless jungles of Thailand and Cambodia with his comrades to capture wild elephants with ropes. Back then, hundreds of thousands of the huge creatures were on the loose throughout Asia. Prized as beasts of burden, the elephants were rounded up, sometimes in entire herds, and put to work.

Today, due mainly to habitat loss and degradation, Asian elephants are an endangered species. With the wild population down to fewer than 45,000, the situation has become so urgent that the U.S. Congress recently authorized the expenditure of $25 million over five years for conservation and protection programs. In Thailand, only 1,350 elephants still roam free and another 3,800 captive animals there have fallen on hard

Deep in the jungle, an Asian elephant grapples with an illegally cut teak log.

times. Nowadays, Homhuan reenacts his earlier hunting exploits for tourists at the annual Surin Elephant Fair and Roundup. Staged each November in the northeastern town of Surin, it celebrates a time when the elephant bestrode the Thai landscape and psyche like a colossus. For more than seven centuries, this intelligent creature served as Thailand's primary

The elephant was deeply enmeshed in the fabric of Thai life. Its image graced temples, palaces and the national flag.

throb of drums, warriors sway in howdahs bristling with spears while swordsmen shield each elephant's legs. After the fortress is "taken," the victorious Thai king appears astride the neck of a richly caparisoned tusker, and an announcer tells the several thousand spectators: "These scenes are like a dream. They can only be found on the walls of ancient temples."

A tourist feeds the animals at the Thai government's conservation center. A modern elephant hospital complex is located nearby.

mode of transportation, penetrating precious teak forests, thundering across battlefields, performing ceremonial duties, and serving the king and the royal court.

Marshaling what is probably the world's largest assemblage of domesticated elephants, about 140 in all, Homhuan and other elephant keepers, or mahouts, from all over the country show how the animals were once used as "armor" to advance against an enemy fortress. To the doomsday

A modern scene involving Thai elephants is likewise apt to resemble a dream—a nightmare. This one is being played out some 335 miles north of Bangkok at an elephant hospital located on a secluded hillside near the town of Lampang. Consisting of an intensive care unit, a laboratory and several infirmaries and rest areas, the hospital is located in the Thai Elephant Conservation Center, a complex owned by the Forestry Industry Organization, a gov-

ernment-run timber enterprise. Here, a patient named Pung Kammee, nervous and fearful, is being treated for amphetamine addiction. Nearby, 45-year-old Sidor Kamlar is recovering from gaping wounds on his hips and legs. At the edge of the hospital grounds, four men with massive staves are trying to pry a 40-year-old cow named Suphan off the forest floor. Abandoned by illegal loggers, she had been worked almost to death, her once magnificent body reduced to a skeleton.

Since it was founded in 1994 by Soraida Salwala, a passionate conservationist, the world's first modern elephant hospital has treated about 300 cases. Among those in its care are victims of cruelty and overwork, dying orphans and aging castoffs.

Once elephant handlers were bound to their animals by respect, affection and mutual dependency. Now it's a different story. Illegal loggers hack elephants like Pung Kammee and Suphan with knives and spears to keep them working at top speed. Many animals are fed bananas spiked with amphetamine pills to push them far beyond their normal capacity. Tourism likewise takes a toll. Poorly trained animals tumble down hillsides while toting tourists on so-called jungle treks. Snatched from their mothers too early by ignorant hotel promoters and elephant-show operators, cute calves are fed indigestible milk, pesticide-tainted vegetables and other foods that cause illness and even death. Some elephants are brought to the hospital by impoverished mahouts seeking an alternative to turning their charges loose in the rapidly developing countryside or having them slaughtered for meat.

Salwala became obsessed with the elephant's plight when she was 8 years old. One day she and her father happened on a tusker lying wounded by the side of a road, its stomach heaving, its owner weeping nearby. "Uncle Elephant was hit by a truck. Please, let's take him to the hospital," she pleaded with her father. It was, of course, impossible. Nothing could be done. "As we drove away," she recalls, "I heard a gunshot, and father said, 'Uncle Elephant is now in heaven.' So I asked him, 'Why did he have to walk on the road?' And that question remains with me to this day."

Salwala's Friends of the Asian Elephant, one of several small but vocal Thai groups bent on preserving the animal, is hard-pressed to keep the hospital going. The monthly expenses of more than $5,000 must be covered by private donations. Everything comes in jumbo sizes. The open-sided operating theater is half as big as a tennis court. Vaccination against tetanus, a lethal disease for elephants, requires a 200-cubic-centimeter drip in saline solution (humans take 0.5 cc). A recent procedure required one vet and a half-dozen assistants, including two who were needed just to depress a two-foot-long syringe. The patient, Bua Thong, a 64-year-old bull with sad eyes and long lashes, stood quietly as a paste of calcium hydroxide and sterile water was injected deep into his right tusk cavity. Ivory poachers had sawed off the tusk, causing an infection that had lasted a decade. "For hundreds of years, men treated elephants as friends," Dr. Preecha Puangkham, the medical director, told a visitor after the operation. "Now,

Both enjoy being hosed down, but the pampered royal elephant (top) is healthy; the hospitalized worker (above) is exhausted.

A domesticated elephant begging for food at a shopping center epitomizes the creature's sad plight throughout Thailand.

people treat an elephant like a car. If it breaks down, they get rid of it and find a new one."

At the turn of the century, forest covered as much as 90 percent of Thailand and accommodated as many as 300,000 elephants, a third of them domesticated and holding down essential jobs. Among princes and peasants, in courts and rice paddies, the elephant was deeply enmeshed in the fabric of traditional life. Its image graces scores of Buddhist temples as well as royal palaces; a white elephant was once the symbol that appeared on the national flag, which is why Westerners called the country the Land of the White Elephant. Many of Thailand's proverbs are couched in elephant terms. A father might counsel his son: "When inspecting an elephant, examine its tail. When looking at a prospective bride, examine her mother." Every schoolchild was taught about Queen Suriyothai, who in 1549 disguised herself as a warrior and, maneuvering her agile war elephant in front of a Burmese attacker, took a mortal blow that was intended for her husband.

Three centuries later, King Mongkut of Siam, as Thailand was then known, offered to give some elephants to the United States. They would multiply into herds, Mongkut said, and become "beasts of burden, making them of benefit to the country." President Lincoln declined the gift because, he noted, "steam has been our best and most efficient agent of transportation."

Today Thailand's green canopy covers less than 20 percent of the land, and elephant numbers are plummeting. "It's a straight curve down," says Richard Lair, author of *Gone Astray: The Care and Management of the Asian Elephant in Domesticity*. "It's a grim situation."

It's the same story across the rest of the continent. Like its larger African relative, the Asian elephant is in decline throughout its range. The once teeming herds vanished as farmers stripped forests and lush grasslands. The fragmented populations that are left have been boxed into several dozen scattered national parks, all of which are under unremitting attack by poachers, woodcutters and influential land-grabbers. When the creatures stray beyond these inadequate confines, angry farmers often respond with

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gunfire or poison to protect their crops from the big gobblers, who may consume as much as 400 pounds of vegetation in a single day.

Over the past few months, five domesticated elephants—all females—have been let loose in the wild in Thailand after two years of preparation. The animals wear radio collars that enable scientists and rangers to track their movements. If the five adapt well to the forest, scientists may conclude that reintroduction of domesticated elephants to the wild is one way to reinvigorate dwindling populations in several wilderness areas in Asia. "There could be problems with crop raiding," warns Michael Stüwe, a biologist with the Smithsonian's Conservation and Research Center who specializes in tracking. "But so far, so good."

The bad news is that elephants are still being used by log poachers to help destroy much of what remains of their precious habitat. This is happening in some of Thailand's last great forest reserves, like the 625 square miles that make up the Salween National Park and the Salween Wildlife Sanctuary, both located on the border with Myanmar (formerly known as Burma). There, outlawed logging is a business rife with treachery, corruption and death, for men and elephants alike.

Recently a team of forest rangers, recovering logs felled illegally, demonstrated how hard elephants must work. Their three animals first had to gingerly slide the massive logs down a dangerously slick slope. Using chains, they then dragged the logs along a rocky streambed to a trailhead, where tractors waited. Jungle juggernauts they may be, but the elephants heaved and struggled to tow the logs through that deep, narrow gorge, a netherworld of dense teak trees through which only slivers of sunlight could penetrate.

"When I'm here, the log poachers are over there," one of the rangers complained the next day, pointing to the other side of a hill. "And when I am there, they're here." The almost daily skirmishing began in 1989 when Thailand, alarmed by the rapid disappearance of its forests, banned all logging. The edict sparked sky-high wood prices, a massive loss of jobs and a dramatic increase in illegal cutting. Many elephant owners, already living on the edge of poverty, chose to break the law rather than sell, abandon or kill their animals.

Able to tread where machines cannot go, these slave laborers are essential to illicit loggers, whose equipment also includes souped-up trucks, spotlights used to blind pursuing officials and high-tech electronic gear for monitoring police communications. The animals, forced to work at breakneck speed at night, are often injured. Extreme fatigue leads to internal bleeding and susceptibility to disease. The lucky ones get caught and end up at a holding facility in northern Thailand, where they are well

A bronze tusker looms over a guard at the Grand Palace in Bangkok. By tradition, certain elephants belong to the king.

cared for while the courts decide what to do with them. As many as 300 animals have been impounded there in recent years.

Dr. Puangkham estimates that more than 1,500 elephants are presently involved in illegal logging in northern Thailand alone. As nasty as the work is, it may be better than no work at all. If the authorities are ever able to suppress the undercover business, the animals would lose their jobs, and their value; the overall population would then plummet further. "The only viable alternative for elephants is

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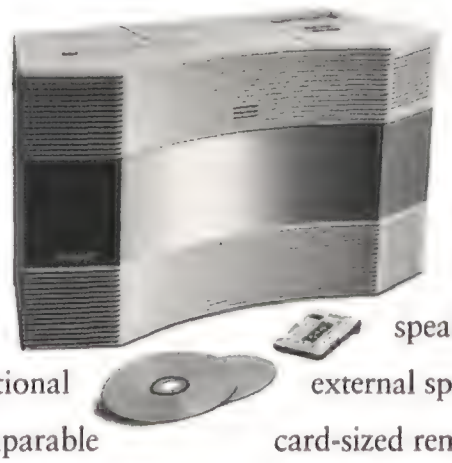
(Though not necessarily its only reward.)



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tourism," says author Richard Lair, whom the Thai people call "Professor Elephant" for his intimate knowledge and love of the species. "It's not a bad life if the operation is well run. The animals are in a natural setting and they get plenty to eat."

Elephant tourism has proliferated in recent years. If you choose, you can ride atop an elephant to view the ruins of ancient capitals, the villages of hill tribe minorities in the so-called Golden Triangle, or the notorious Death Railway, built by Allied prisoners of the Japanese during World War II. The novelty of an elephant ride appeals to many visitors, but those who respect the dignity of the animals criticize some of the more humiliating shenanigans for which they are being enlisted, such as performer Michael Jackson being greeted by a baby elephant "rock 'n' rolling" to one of his songs at a Bangkok hotel not long ago, and a recent "fashion show" that featured elephant "models" wearing makeup, earrings and sunglasses.

Then, on the other hand, there is Sangdeun Chailert's Elephant Nature Park, near the northern city of Chiang Mai. On a cool morning there, chattering tourists from Japan, England, France and Italy clamber excitedly aboard a dozen elephants for a trek through an idyllic valley. The distinctive sound of wooden clackers, strung around the elephants' necks like cowbells, identifies the animals and alerts villagers should the beasts stray into the rice fields.

"*Pai, pai!*" "Go, go!" The mahouts prod their charges whenever the animals decide that foraging is more fun than walking. Nobody bothers to discipline 9-month-old Yindee, who presses up against her mother during the excursion and later butts the visitors after they dismount in quest of bananas to feed to the elephants. "You can tame elephants with love," Chailert says as she watches her herd luxuriate in the river that runs by her camp. Actually, she knows as well as anyone that it takes discipline as well as love to tame an elephant, but the discipline must be balanced by rewards for good behavior. Chailert's rules are tough: elephants can't work more than two hours a day, someone must care for them around the clock, and goads or hooks must be used sparingly.

The Asian elephant is in decline throughout its range. The fragmented populations that are left have been boxed into parks.

At the privately owned Elephant Nature Park near Chiang Mai, tourists enjoy a ride across a river while a half-submerged youngster gamely tags along beside its mother.

Chailert likes to go on occasional elephant shopping trips at the Thai-Myanmar border, where a healthy specimen between 8 and 12 years old currently sells for about $6,500. This is the logging region where so many domesticated animals are treated harshly. It's also home to some of the country's traditional elephant keepers, the Karen tribespeople. When Chailert buys or rents an elephant, she tries to obtain the services of its mahout in order to maintain the lifelong bond between keeper and animal, and thus preserve the storehouse of elephant knowledge and myth accumulated over the centuries by people like the Karen.

Bonds to the past are also being maintained in Thailand by the royal household and King Bhumibol Adulyadej, the caretaker of an elephant culture that dates back to ancient mythology. Says royal veterinarian and nobleman Dr. Phiphatanachatr Diskul: "Thailand is the last place where the customs of the white elephants have been

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preserved. In Myanmar, Laos and Cambodia, these traditions have vanished."

The Thai people have long revered the so-called white elephants as the earthly manifestations of Erawan, the many-headed celestial elephant of the god Indra. In the 16th century, a jealous Burmese ruler went to war when the Thai king refused to give him two white elephants from his stable of seven. One Dutch trader chronicled how a grieving 17th-century Thai monarch ordered the execution of all keepers of a young white elephant that had died suddenly while in their care. Then he staged a sumptuous cremation ceremony because, the trader said, "the Siamese pretend . . . there is something divine in these animals."

By law, every white elephant in the realm must be presented to the king, but it's not easy for an animal to get into this exclusive club. When someone comes up with a prospective member, experts delve into arcane texts that detail the unique qualifications to be met. A mellifluous call, a beautiful tail, a long trunk, even pleasant-smelling droppings, are among the characteristics that are considered before an elephant is presented to the royal ruler. Although these creatures are often, and incorrectly, referred to as "albino" elephants, they are not devoid of pigment and do not have pink eyes. In fact, only one of the 11 white elephants in the royal collection is strikingly pale. The other 10 look like normal elephants. The proper name for these creatures, *chang samkan,* means "important" or "significant" elephant.

It takes discipline as well as love to tame an elephant, but discipline must be balanced by rewards for good behavior.

White elephants are treasured and pampered but not strictly according to custom. Ten of the kingdom's whites have been moved from the palace grounds in Bangkok to Thai government facilities; six are housed at the extensive Elephant Conservation Center, which includes the aforementioned hospital. Here, four keepers are assigned to each animal. Accompanied by their retinues, the elephants mosey into replanted teak forests each morning for a day of foraging. At dusk they return to the compound, where they frolic in a reservoir like babies in a tub. An evening snack of sugarcane and tamarind awaits them in their individual sleeping pavilions, each immaculately maintained and ringed by neatly manicured lawns.

Along with the royals and the Karen, the other surviving guardians of elephant lore in Thailand are the Suay, who live in the northeastern part of the country. These are Len Homhuan's people. Once they were fabled elephant trappers and trainers who mounted yearly expeditions into Cambodia's jungles with little besides bamboo poles and ropes. Those forays ended in the early 1960s. The Suay hunting grounds in Cambodia were turned into Khmer Rouge killing fields, the frontier was strewn with land mines and the trumpeting of elephants gave way to the chatter of gunfire.

A month after the elephant festival at Surin, one of the participants, a bull named Denchai, showed up at an outdoor bar in the seaside resort of Hua Hin. His trunk was draped around a European tourist and a Thai prostitute. His mahout was trying to cajole the couple into buying a small bag of cucumbers, which they could then feed to the hulking tusker.

This is what the elephant has been reduced to in Thailand. You can see the degrading spectacle on display every day in Bangkok, of all places, where, technically, elephants are banned but where, in reality, authorities often look the other way. The animals show up on Silom Road, Bangkok's "Wall Street," or at the notorious nightlife strip on Patpong Road or at the huge suburban shopping center called Future Park. It's a surreal scene: an elephant stands amid traffic jams and exhaust fumes while a chic, pregnant woman walks under its belly. She hopes this will bring her a safe delivery, and gives the mahout some change. As legend has it, the mother of Buddha conceived him after dreaming that a white elephant touched her right side with a white lotus that it was holding in its trunk.

Just a short walk from Future Park, one is startled to come upon a tiny village that is an oasis of old Siam. A wooden bridge spans a tree-lined canal. There, a Buddhist temple shelters a 10-year-old elephant named Ploy. Only a jumbo jet descending toward Bangkok's airport, and the distant high-rises, serve as reminders of the encroaching 20th century. Abandoned several years ago, Ploy may remain here until the end of his days. "We took pity on him," says a young novice. "Elephants are our legacy."

A good-natured animal, Ploy eagerly scoops up his toy, an auto tire, with his trunk and tucks it between his front legs. "It's like a doll," explains one of the village boys. "If you take it away from him, he cries."

Anthony Mecir reports on environmental and cultural issues in Southeast Asia. London-based photographer Michael Freeman has been associated with SMITHSONIAN *for 20 years.*

They seem to be praying for better days, but the kneeling mahout and his prostrate charge are actually rehearsing a royal ceremony.

HARRIS TWEED

BY JOSEPH HARRISS

PHOTOGRAPHS BY MARK S. WEXLER

ON THE HEBRIDES ISLE OF HARRIS, WEAVERS ARE STILL PRODUCING THEIR SOUGHT-AFTER TEXTILE

TWEEDS

IT'S 8 O'CLOCK OF A SPANKING SPRING MORNING AND already the low fluffy clouds are scudding across a busy blue Hebridean sky. Beneath them scurry fleeting patterns of dazzling sunshine and gray shadow on the Luskentyre tidal flats, where rivulets of seawater rill lazily across vast, sandy stretches. Donald John MacKay, dark bangs on his forehead and a blue cotton work jacket on his back, glances through his living room window at the familiar wondrous scape. On a day like this, he can make out the low outline of the Isle of Taransay which, as the gull flies, is the only thing in the Atlantic Ocean between him and North America, roughly 3,000 miles due west. He drains his cup of strong breakfast tea, gives his eager black-and-white sheepdog an affectionate cuff on the muzzle and heads for work.

Crossing his yard to a corrugated iron shed with a faded red roof, he ducks through the low door. "Mind the door," he says courteously, but I've already banged the top of my head. "I always tell people that too late," he admits wryly, looking over the 696 multicolored warp threads on his hand loom, where a heathery, blue-green herringbone tweed is taking shape. He picks up a red can and squirts light oil on treadle shafts, bearings and picking rods, tweaking one or another to satisfy himself the ancient machine is in tune.

Then he hitches onto a high, narrow wooden bench with a tattered piece of wool cloth serving as cushion, places his feet on the worn iron treadle pedals and starts pumping. *Clackety-clack WHACK—clackety-clack WHACK—clackety-clack WHACK* goes the loom. The warp beam feeds the wool yarn lengthwise through the bobbing heddles (wires that lift alternate strands). A lever then loudly whacks the wooden shuttle through the space between the warp strands with a length of weft, or crosswise strands.

MacKay, 46, who learned tweed weaving from his father,

Shears and whisk (left) signify the handwork invested in a finished Harris Tweed. Each Hebrides-woven bolt bears the trademark (above).

starting with filling bobbins at age 8, has been at it professionally now for 28 years. Because he works out his own patterns—he particularly loves doing the intricate designs and colors of tartan-style tweeds—and has his own faithful customers who keep coming back year after year, he's considered one of the most creative and independent of the hand weavers on the Isle of Harris. Every day but Sunday, he keeps his cast-iron Hattersley domestic loom humming at a rate of 5 yards per hour and tries not to quit until he's produced a minimum of 25 yards. "My biggest problem is getting mentally tired," he shouts over the clatter. "Watching these threads going back and forth all day. Sometimes on a rush order I'll go until 2 A.M., but I'm doing it by rote then. This one's for a tailor in Ann Arbor who wants it for a jacket." He pauses a second and queries his American visitor: "That's in Minnesota, isn't it?"

It might as well be, for all the relevance the outside world has to the remote Isle of Harris. One of the islands of the Outer Hebrides, which chain down 130 miles of the magnificently rugged northwest coast of Scotland, hilly Harris is linked like a Siamese twin to the larger, peat-covered Isle of Lewis. Together they are often called the "long island," but they're only about half as long as the one in New York. With the others in the chain—North and South Uist, Benbecula, Barra, and several smaller islands—they are officially known as the Western Isles (*Na h-Eileanan Siar* in the local Gaelic) and have a total population of about 29,000. That's about 25 persons per square mile, compared with 180 on the Scottish mainland. The Minch, the body of water that separates Lewis and Harris from the mainland, is only 24 miles wide at its narrowest, but the cultural distance from there—not to mention from the New World—is much greater in space and time.

Boulder-strewn, peat-bogged, windswept, with coastlines like a set of snaggled witch's teeth, the Western Isles have the awe-inspiring, elemental beauty of lonely, seagirt places shunned by most of the human race as too far, too forbidding. Perhaps appropriately, they are the home of one of the world's best-known textiles, a durable and rough, simple and faithful, woolen fabric known and worn from Argentina to America, Switzerland to South Africa: Harris Tweed. In an age when the fashion press tells us that stylish folks are wearing polyester, nylon, viscose, olefin, neoprene and Tencel, Harris Tweed remains its handwoven self. If it's true, as fashion designer Karl Lagerfeld has said, that "these new fabrics are the most important thing of the '90s," then stop the world, I want to get off.

The terrible truth—from the rag trade's point of view—is that Harris Tweed lovers don't follow fashion very closely. Indeed, the longer you wear it, the better the fabric looks. My personal clothing polestar is a heavy, tough Harris Tweed overcoat that I bought at Burberrys in London's Haymarket Street in the early 1970s and wore, hard, for a quarter-century until my wife got jealous of how classy it was starting to look, and gave it away. Somewhere, there's another unfashionable guy out there still getting good wear from that coat. Not for nothing did the Scottish Gaels of the Isle of Harris traditionally sing an old Gaelic song as a "blessing" upon the giving of a new tweed: "Mayest thou enjoy it, / Mayest thou wear it, / Mayest thou finish it, / Until thou find it / In shreds, / In rags, / In tatters!" In other words, here's wishing a very long life to whoever possesses it.

An armchair psychologist might try to explain my attraction to both cloth and island by a coincidence of names. But that would overlook the fact that, as far as Bill Lawson knows—he's the quietly erudite resident genealogist in the islands—there's never been a family there by the English name of Harris. (The island's name is an English transliteration of the Gaelic *Na Hearadh*, from a pre-Gaelic name that was thought to mean High Island.) No, just as the Hebrides seem to have bewitched ordinary mortals and druids alike with their lonely, mute mystery, their uncompromising cloth is a monument to authenticity and sensible dressing. I confess to being a sucker for both the place and the cloth it produces.

Like any respectable British monument, the cloth of the Outer Hebrides is defined and protected by an act of Parliament. In this case, the Harris Tweed Act of 1993, "enacted . . . by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons." The act declared that it was vital that "the integrity, distinctive character and worldwide renown of Harris Tweed should be maintained."

At the same time, it created the Harris Tweed Authority (HTA), a nonprofit public body charged with promoting the cloth and making sure that every bolt of it complies with the legal definition as laid down by Westminster: ". . . handwoven by the islanders at their homes in the Outer Hebrides, finished in the Outer Hebrides, and made from pure virgin wool dyed and spun in the Outer Hebrides." This guarantees the uniqueness of the product, virtually the only mass-produced clothing material in the industrialized world that is still handwoven.

Once made exclusively from the wool of the Cheviot and Scottish Blackface sheep that roam the island, Harris

My clothing polestar is a heavy Harris Tweed overcoat I wore for a quarter-century until my wife got jealous.

Tweed is now made with only Cheviot and other soft wools, mostly imported in raw form from the mainland, and sometimes—since a 1996 amendment to the Harris Tweed Act—from outside Scotland. (The coarse Scottish Blackface wool is exported for use in the manufacture of carpets.) The wool for Harris Tweed is dyed, carded and spun into yarn, then woven by independent weavers, all in the Outer Hebrides. For the most part, the large textile mills buy the wool and furnish the yarn to weavers. These artisans then create the cloth as work for hire, giving it back to the mills to finish (clean, soften, shrink and crop) and prepare for HTA examination.

Before the HTA stamps a bolt with the famous orb-and-Maltese-cross trademark—the oldest British trademark in continuous use, dating from 1911—the inspectors see every yard of it. They also register a swatch of it along with the owner's signed declaration: "I, ____ SOLEMNLY declare that the Tweed Coloured ____ (of which a specimen piece is attached hereto), presented by me to be stamped with the Harris Tweed Trade Mark is made entirely from PURE VIRGIN WOOL . . . that the wool was DYED by ____ and SPUN by ____ and that the tweed has been HANDWOVEN by ____ at ____."

All the formalistic rigmarole also distinguishes Harris Tweed from its cousins—Welsh, Saxony, Yorkshire, Done-

From his shed on Harris, weaver Donald John MacKay (opposite, top) produces some 25 yards of tweed daily on his cast-iron Hattersley loom. On the nearby Isle of Lewis, mill workers (left) inspect tweed fabric before it is washed and finished.

Blackface sheep, ubiquitous on the island but no longer a source of Harris Tweed wool, wear dye blazes to show ownership.

gal and West of England tweeds, among the best known. Like a good wine, a tweed is usually named for the place it comes from. Tweeds are all relatively heavy, rough-surfaced fabrics. They can be woven in herringbone, houndstooth, glen check, windowpane, diamond and other patterns artfully flecked, striped and mingled in a mix of colors.

But whereas the wool fibers in other tweeds often are politely combed in parallel and then all twisted the same way, giving them a smoother finish, the fibers for Harris traditionally are left tousled and then twisted at random, producing its characteristic rough feel and hairy finish. Its yarn, spun of dyed wool, often combines up to ten colors. "Multiply that by, say, four strands of yarn, two types in the warp and two in the weft, and you have as many as 40 colors in one garment," explains Derick Murray (license plate: 1 ORB). He is the owner of the Kenneth MacLeod and Kenneth MacKenzie textile mills in Shawbost and nearby Stornoway (pop. 8,000, the only large town in the islands). Those mills, along with one other, supply the weavers with their yarn and finish the cloth. "We consider that to be one of the main differences between Harris and other tweeds—its subtlety and endless variety of coloring," says Murray.

But one thing all tweeds—including Harris—do have in common is that, logic to the contrary, their name apparently does *not* come from the River Tweed in the Borders area of southern Scotland, home to many woolen manufacturers. The favored story goes like this: in the early 19th century, a London clerk, no doubt ink-stained and harried in the true Dickensian manner, was drawing up a rush order for a shipment of twill cloth, which was called by an old Scottish word, "tweel." He either wrote "tweed" by mistake, or his scribbling was mistaken for "tweed," versions differ. But the result is that the coarse, twill-weave cloth he shipped has been known as tweed ever since.

The Hebrideans themselves have long called the material *clo mor*, literally "big cloth," because of its heaviness and coarseness. It has been very special to them. Wool being not only warm but also virtually waterproof due to its natural oils, it's always been a reliable shield against the

islands' persistent chill wind and rain. But the cloth has also played an economic, cultural and social role for them over the centuries.

In the days before the widespread use of currency, the islanders sometimes used tweed as a means of exchange instead of money, often paying the rent to landlords with bales of fabric. It became central to much of their Gaelic folklore, too. Everyone knew that fairies could be warded off from damaging the cloth during Sunday rest by placing two colored threads on it in the form of a cross.

Tweed making has long been central to Hebridean social life as well. Waulking—the process of cleansing and rubbing (and thereby softening) a new Harris Tweed just off the loom—was, as the knowledgeable local historian Francis Thompson notes, performed by groups of women "for whom it was a social occasion, a bit like quilting in early America." They spent hours pulling, pounding and turning the cloth on a table, and singing Gaelic songs, many from the 15th century or earlier.

Today the tweeds are mill waulked and finished. Another chore that island women no longer do is collecting lichen and other plants to make dyes. Chemical dyes gradually replaced vegetable brews as the necessary plants became scarce and the market demanded brighter hues. Traditional Harris Tweed colors were orange, from ragweed; green, from heather or stinging nettle; red, from lichen or roots of lady's bedstraw; yellow, from bracken root or cow parsley; purple, from elderberries; and other varicolored Celtic concoctions. As an HTA document carefully explains, extracting vegetable dye required using "an old enamel pan, or for larger quantities a big pot large enough to hold the plant material and water to cover it completely." The crotal lichen, the color of winter heather, used to be especially prized.

Katie Campbell, a sturdy, affable, 63-year-old weaver in Plocrapol on Harris' east coast, still keeps a small, bright bag of vegetable-dyed wool beside her old Hattersley loom. It was done by her husband's aunt, Marion Campbell, doyenne of the traditional Harris weavers, who recently died at 86. Campbell turns out an ineffable, heather-purple

cloth that's as heavy and scratchy as any Harris Tweed lover could ask. She modestly claims she's still learning the secrets of beautiful tweed, despite her 32 years at the craft. "The colors, especially," she says. "If I want inspiration for a new tweed, I just look out my window at the changing tones of heather on the hills and the color of the water in the Minch. I'm still trying to match them perfectly."

Inspiration—in the guise of light, color, texture—is everywhere. Take, for instance, the seemingly round-the-clock, far north summer days with light so subtle you can't tell whether you're looking at a sliver of sea or a swatch of lavender cloud caught on the horizon. Or immense Scarista Beach, where the feet sink into a fine golden cockleshell sand and the water is a surprising Bermudian turquoise. Or the fields around Donald John MacKay's Luskentyre home, carpeted with a riotous mosaic of white and yellow daisies and buttercups, gentian, blue harebell, sea pink and wild orchids, mixed in with random clumps of iris, bog pimpernel and showy primroses.

The Harris Tweed palette seems to reflect elements of the islands' fauna, too. The more than 100 bird species range from sandpipers, redshanks, ringed plovers and curlews with long curving beaks to golden eagles, like the pair I caught in my binoculars as they flared for a landing at their aerie atop the 1,500-foot Roneval summit near the village of Rodel. Herds of Scottish Blackface sheep—here sheep easily outnumber humans—abound.

The ancient dark Lewisian gneiss—named for the Isle of Lewis—that forms these islands makes them among the oldest land surfaces in the world. Dating from some 2.5 billion years ago, these Precambrian rocks existed long before either the Alps or the Rockies were formed. They

Weaver and sheep-fancier Katie Campbell (left) draws inspiration for the subtle palette of her tweeds from Harris' sky, sea and hills.

were pounded by the Atlantic for an impressive number of aeons before the last Ice Age hit about two million years ago, scouring the landscape into the pebble-smooth mountains that frame the Hebridean horizon. When the glaciers melted, they left bare the black bedrock and hundreds of lochs and smaller lochans where brown trout and salmon flourish today. Three thousand years ago, decomposed vegetation began to form the peat moor. Growing at about three inches every 60 years, it slowly smothered other plant life for millennia.

Today it's 15 feet deep in places. That's particularly convenient on nearly treeless islands with no other natural source of fuel. In May, many villages on Lewis and Harris throw a convivial peat party. In the village of Bragar the looms stop, businesses close and everybody devotes a full week to digging dark-brown squares of peat on the common grazings, for which they pay a token annual fee of three pounds sterling. At week's end the villagers leave rows of cut peat to dry for a fortnight, then cart it home with a tractor and wagon to be stacked neatly behind the house.

The Callanish megaliths, among the most ancient prehistoric monuments in Europe, were erected on Lewis c. 1800 B.C.

It will fuel heating and cooking for the next 12 months.

Glaciation left only a scanty layer of soil, making even the simplest agriculture difficult. On Harris' east coast, crofters (tenant farmers) eke out a few potatoes, oats and other vegetables by heaping the thin soil, along with fertilizing seaweed, into "lazy beds" among the boulders. In this hardscrabble environment, just making a living means stringing together as many activities as possible: farming plus keeping sheep and a cow or two, plus weaving tweed just about makes a crofter's ends meet.

Throughout the Outer Hebrides, and especially on Lewis and Harris, are reminders that these islands, however inhospitable, have been inhabited for thousands of years, at least since the Bronze Age. Perhaps the most impressive remnants of early civilization here are the Callanish megaliths on the west coast of Lewis. One of the most remote and ancient prehistoric monuments in Europe, erected around 1,800 B.C., these 49 standing stone sentinels in the rough shape of a Celtic cross probably served the same religious and cultural functions as those at Stonehenge in England are thought to have done: marking the seasons and, at some point, hosting druidic rites.

The Irish Gaels who pushed the Picts out of the islands gave way to the Vikings, who began invading in the 800s. Their occupation was confirmed in 1098 when Norwegian king Magnus II Barefoot formally claimed the islands and cut a deal with Scottish king Edgar about their respective spheres of influence. But the Hebrideans got restless under Norse rule and repulsed a Norwegian expedition under King Haakon IV in 1263; three years later Scotland recovered the islands by the Treaty of Perth.

Foreigners left the Hebrideans alone until the Scottish rebellion under Bonnie Prince Charlie was defeated in 1746 and the English set about methodically eradicating Gaelic culture and consciousness. They forbade the wearing of tartans and the playing of pipes; tens of thousands of Scottish Gaels were driven from their homes to be squatters on poor land. Then, in the mid-19th century, the landlords of Harris began sheep farming, uprooting the crofters to make room for sheep to graze. Most crofters were evacuated to Cape Breton, Nova Scotia. Many of those who remained finally left for Canada and Australia when the potato blight hit, as it had in Ireland.

The islands still bear the scars of the past—the population of Harris, for instance, is about 2,000, nearly equal to that of the 1750s—but a Gaelic renaissance has begun. Long forbidden by English-speaking landlords, even though it was the islanders' mother tongue, Scottish Gaelic is now officially taught in the schools. The local weekly, the *Stornoway Gazette*, regularly publishes articles in Gaelic, including the occasional Gaelic crossword puzzle. The language is being reincorporated into public life, with Hebrides authorities and businesses adopting Gaelic names.

Another throwback to tradition is that on Lewis and Harris, all activity comes to a screeching, full-fledged, Scottish Presbyterian stop each Sunday. Not only are the tweed looms stilled, but most shops, gas stations, pubs and restaurants close, and even public transport is halted. The landladies of some bed-and-breakfast establishments prefer that guests not arrive or depart on a Sunday.

But Harris Tweed itself is now undergoing a cautious transition. Made fashionable in the mid-19th century by Lady Dunmore, widow of the late owner of the Isle of Harris, who flogged it to her aristocratic friends as just the thing for hunting and other outdoor sports, the typical heavy, hairy tweed has lately been less in demand in the age of central heating and blue jeans-cum-workshirt dressing down. The number of weavers of the tweed in Lewis and Harris has declined, and there are practically none in the rest of the Outer Hebrides.

Enter the Griffith double-width hand loom. Developed

Stored at a mill before being carded and spun, rainbow-hued wools demonstrate market demand for brighter Harris Tweeds.

over five years to be lighter, quieter and cleaner to operate, it also can produce tweed 150 centimeters wide, compared with half that for the old Hattersley loom. "Even a product as traditional as this feels the chill hand of market forces," explains Ian MacKenzie, head of the Harris Tweed Authority in Stornoway. "Many of our garment-maker customers are going to new laser cutters, and they're all geared to this width. This loom also gives us the capability of weaving softer, lighter tweed with more patterns and colors, and that's what the women's wear market is looking for. Like any other product, we have to give the market what it wants." Adds mill owner Derick Murray, "The women's wear market is huge, and we're going for it. But don't worry, we won't be making the cloth too light or too soft. That just wouldn't be Harris Tweed."

Nearly half of the 350-odd weavers have now adopted the new loom, which uses bicycle pedals and chain to make it go, a high-tech plastic punch card to control colors and patterns, and a high-speed rapier in place of the shuttle to carry the weft. Katie Campbell has watched it work but has decided to stick with her old model, though she finds the Griffith "a wonderful piece of equipment."

Lews Castle College in Stornoway now uses the new loom exclusively in its commercial weaving courses, where eight students at a time spend 20 weeks learning all aspects of Harris Tweed making, from tying the weaver's knot to blending and matching colors. Says Angus Morrison, an instructor, "Clothing designers haven't even begun to exploit the potential of this loom."

Many are already trying. Harris Tweed, priced at about $17 per yard wholesale, now is used for everything from the traditional jackets and suits to handbags, luggage, baseball caps and $400 golf bags (Harris Tweed club covers, $60 extra). The largest purchaser of Harris Tweed in North America is the mail-order firm Land's End. Ultra-hip Japanese designer Michiko Koshino includes the cloth in bags, retro reefer jackets and quilted coats. Christian Dior's latest winter collection featured high-fashion mannequins with killer makeup ankling down the Paris catwalk in Harris Tweed turquoise dresses and jackets and form-fitting cyclamen-pink suits. "It's hardly a fabric that you associate with haute couture," says designer John Galliano, who did the Dior collection, "but this new cloth is more supple, drapes well and handles beautifully. I much prefer working with noble fabrics like wool, silk and linen, and Harris Tweed is one of the noblest of them all."

Back in Luskentyre, Donald John MacKay wishes designers like Galliano well. But he doesn't plan on getting a double-width loom or making softer, shocking pink Harris Tweed. "I've got nothing against it," he says at the end of a long day in the weaving shed, with a glorious sunset beaming through the front window of his living room. "I think there's room for both kinds of Harris Tweed, and I know what my customers want." So he'll keep on crafting his scratchy cloth of unique colors and patterns for satisfied tweed lovers in places like Ann Arbor. Wherever that is.

Joseph Harriss, who is Paris-based, wrote most recently for SMITHSONIAN *on craft guilds. Mark Wexler is headquartered in Chicago.*

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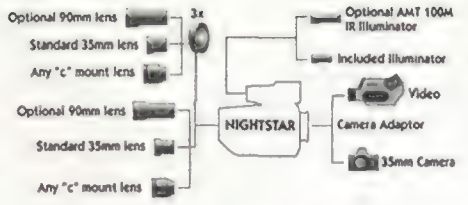

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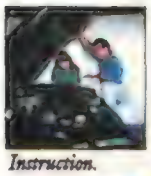
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From Saints to Sunsets:
The Late Great Works of

Delacroix

BY HELEN DUDAR

YOU COULD SAY THAT EUGENE Delacroix was your average work-obsessed man of art. His needs were basic; he merely hungered for attention, praise, sales, fame and honors, and while he lived, got them in fair, albeit uneven, measure. But even he, a man who rarely questioned his own genius, might have been staggered by what posthumous celebrity has wrought. In this, the bicentennial of his birth, Delacroix became France's tourist event of the year. Beginning in spring, stretching through summer and spilling over into winter, a Delacroix devotee could find at least nine exhibitions around the country. Paris had paintings and drawings at the Grand Palais, a

Delacroix painted numerous versions of *Christ on the Sea of Galilee*; this one dates from 1854.

dazzling if nearly indigestible array of 250 works on paper at the Bibliothèque Nationale, and some small treasures at the Left Bank establishment that once housed his studio and apartment and is now a pocket museum bearing his name.

There were Delacroix tributes in six other cities as well, including Rouen, Tours and Bayonne. And after most of the exhibitions had closed down, an insatiable pursuer of Delacroix delights could prolong the pleasure by traveling south from Paris to Champrosay. This is the wooded country town where Delacroix regularly fled the pressures of urban life. In homage, the local governing agency has produced a lavish brochure offering guidance to hearty souls with the stamina and sturdy shoes needed for six long, scenic walks treading "In the Footsteps of Delacroix."

In the interest of balance, it must be pointed out that late last year, Delacroix's face vanished from the hundred-franc note. The replacement—at least until the euro takes over—is Paul Cézanne, a more fashionable figure nowadays, but one who certainly admired and drew inspiration from Delacroix's art.

America gets a small but nourishing sample of France's tributes from September 15 to January 3, when the Philadelphia Museum of Art hosts most of the Grand Palais show—70 paintings and 40 works on paper. The exhibition is supported in part by Elf Atochem North America, Inc.

The show is titled "Delacroix: The Late Work" and concentrates on the artist's final labors, from 1848 to 1863, the year of his death. With this focus, it fills the gallery walls with a parade of surprises. Think of Delacroix, and the name conjures up operatic drama: a Byronic warrior, the Giaour, on horseback, fending off an attacking Turk; the moment from Sir Walter Scott's *Ivanhoe* in which Rebecca, in a dead faint, is swept off by abductors. Art history inevitably and justifiably considers Delacroix the ultimate romantic artist. Endearingly stubborn, he insisted to the end that he was a true classicist.

Romantic imagery is hardly absent from this exhibition, but the show's organizers were lured into the late period by intriguing contrasts to some of the earlier work. For example, one of Delacroix's landmark early pieces is *Liberty Leading the People*, which features an oversize, bare-breasted heroine towering over fevered crowds and brandishing both a rifle and the French tricolor. Presumably, when the French took to the streets to bring Louis-Philippe to power in 1830, Delacroix was, if not swept along, at least observing and possibly sketching notes for the painting to come.

So where was he in 1848 when Paris caught fire again and raging mobs made way for the return of the Bonapartes? The question, posed by Joseph J. Rishel, the Philadelphia Museum's senior curator of European Painting and one of the organizers of the show, is rhetorical. With bemusement Rishel tells us: "The man who brought you *Liberty* some 18 years before was in his country retreat at Champrosay—painting flowers."

His first work accepted for the annual Salon was a vision, both stirring and melodramatic, of Dante and Virgil in Hell.

***The Barque of Dante*, accepted for the 1822 Salon, depicts a scene from the *Inferno*. Although criticized by some for its Baroque qualities, the canvas was purchased by the state.**

The opulent rendering of *A Vase of Flowers on a Console* attests to the artist's mastery.

He had a "wild, strange, exotic, almost disquieting beauty."

The artist's elegance and disarming good looks are clear in an 1837 self-portrait.

A wall of brilliant blossoms is one of the unexpected sights of the show: three paintings overflowing with flowers (plus a fourth abundant with fruits), along with some beguiling watercolors, all done that fateful year of revolution or soon after. They are crowded clusters of nature's gifts, accented as were so many of his paintings by the rich glowing reds particular to his palette.

As far as we know, Delacroix had never before been tempted to fill a canvas with a still life. But in 1848 the artist had undergone the unnerving jolt of a 50th birthday. It may have then seemed essential to him to demonstrate the boundless range of his talent. As the exhibition catalogue notes, he spent some of his last years making his way, methodically and brilliantly, through genres he had ignored in decades past and testing techniques he had never before attempted. Posterity, he was determined, would be compelled to acknowledge a grand master—and, of course, an unblemished classicist.

Among other unexpected sights are the landscapes. To be sure, Delacroix had painted trees and sky before, but usually as background to some historic or mythic scene. Here, we find him recording just a simple row of trees; the lush foliage of a corner garden; the benign rhythms of the sea in Dieppe; and, above all, a ravishing golden-brown sunset in Champrosay.

In fact, sunsets appear to have briefly become a happy obsession. The catalogue shows a number of sunset pastels, although, for protection against the steady glare of gallery light, only a few will be in Philadelphia; several others were in Paris. Streaked with reds and blues and oranges, tranquil even when they are tumultuous, they are reminders of how much more than most of us the artist is privileged to see.

And then there are the "cat" pictures. Lions and tigers, fierce and predatory, bestial and beautiful, attacking a rabbit, attacking each other, fighting off attackers. Delacroix loved those jungle beasts, even when he saw them dead, stuffed and stationary. His journal gives us a feverish account of a visit he made to a natural history collection in Paris, where he was so exhilarated by those immobile creatures of the wild that he found himself "gripped . . . by a feeling of happiness."

The quiet disappearance of the day and the snarling menace of untamed creatures—each captures Delacroix's notice, each represents the extremes of a difficult nature and tells us a little about the man. But not everything. There are shelves of books about Delacroix, including the journals he filled for years with ideas about art, literature and the burdens of time.

Yet, in some ways, he remains an enigma, a figure of mystery who never allowed himself to be solved. His admirers were apt to garland him with exotic descriptions: "a volcanic crater artistically concealed behind bouquets of flowers," wrote Charles Baudelaire, in an assessment more suggestive of the young poet's literary aspirations than of his subject. It was also Baudelaire, worshiper, interpreter and defender, who, perhaps more accurately, declared his idol to be "passionately in love with passion and coldly determined to seek the means of expressing it."

Consider the religious works. Delacroix painted some memorable pieces, and the exhibition offers a rewarding sampling of his New Testament imagery, including a number of Crucifixions, a Lamentation and an Entombment, all of which suggest devotion. But Delacroix, a child of the Revolution, had never been baptized and did not attend church services. Speculation about his beliefs range from the vague notion that they embodied "spirituality" to the conviction that he was a true skeptic. Yet Rishel is not alone in proclaiming him "the greatest French painter of religious subjects in the 19th century."

We are informed that Delacroix "adored" women. But his adoration managed to avoid any liaison that might have lured him into matrimony, thus distracting him from the more important business of art. He fell in love with a peasant girl named Lisette; he had dalliances with a dancer from the opera and the former mistress of a good friend; he engaged in a long affair with a married distant cousin, Baroness Joséphine de Forget. And he ended his days and possibly his nights with his housekeeper, Jenny Le Guillou, an efficient woman who is said to have guarded him with "watchdog ferocity."

It is even possible to be confused about the impact of his appearance. If

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we are to believe one admirer, writing in 1859 when Delacroix was aging and sickly, he had a "wild, strange, exotic, almost disquieting beauty." Beauty is surely to be found in the magnetic 1837 *Portrait of the Artist*, in the exhibition catalogue. But the little Musée National Eugène Delacroix also displays a commanding carved bust of the artist, an unnerving image with piercing eyes, powerful nose and frightening chin.

Characteristically, the circumstances of his birth are shrouded in confusion. He was a late child, the fourth in a family of some social and political standing but relatively modest means. His father, who held a number of government positions, was 57 when Eugène was born, and it seems to have been generally known that the parents had not lived together as man and wife for years. Gossips proposed the true father to be the great statesman Talleyrand, who had been a houseguest of the family. The legend has survived, although no persuasive evidence for it was ever assembled.

Delacroix was a gifted child: a talented musician (harpsichord and violin), an addicted reader and a deft weaver of words. But it was art that seized him on his first visit to the Louvre when he was about 9 or 10. By the age of 17 he had begun studies at a Paris studio, and within seven years was on his way to fame and infamy.

His first work accepted for the annual Salon, in 1822, was a vision, both stirring and melodramatic, of Dante and Virgil in Hell, the two great poets fearlessly upright in a small boat as it plows through roiling waters over the bodies of doomed souls. The picture was bought by the state. The same recognition was bestowed on *Massacre at Chios*, one of his entries to the 1824 Salon. The subject of that painting, however, was far more violent: the Turks' slaughter of Greeks on the island of Chios, a contemporary event that Delacroix had never seen but had imagined from newspaper accounts.

These honors met with less than universal approval. To be sure, there were admirers; but, as one observer has noted, there was also an "accolade of abuse." "Never," wrote the hyperbolic Baudelaire, who took up Delacroix's cause in the 1850s, "was an artist more attacked, more held up to ridicule or more thwarted."

Baudelaire reported that once, during the decade of Delacroix's early triumphs, the artist was summoned to meet with the director of fine arts at the Academy, the organization that started the Salon exhibitions; the director hoped to persuade the artist to "add a little water to his wine"—in

Delacroix's luminous *Lioness Stalking Its Prey* may portray a puma, not a lion.

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A fantasy painted from memories of Morocco, *Arabs Skirmishing in the Mountains* (1863), with its dynamic S-shaped composition, was finished shortly before the artist's death.

short, to tone down his manner. Diluted Delacroix? The idea defies our imagination as it plainly did his.

Delacroix fell out of favor for a time, but even when he was back in the good graces of the state, when in his later years he was winning commissions to decorate palatial public buildings in Paris, he was repeatedly snubbed by the august Academy. His application for admission was rejected six times before the favor of membership was finally bestowed in 1857.

As a social figure in the early years of his ambiguous fame, Delacroix moved easily and regularly among the guests at elegant Paris soirees. From the dependable Baudelaire, we learn

that his manners were brilliantly nuanced: "He possessed quite twenty different ways of uttering . . . '*mon cher Monsieur.*'" And he made some important friendships, including a particularly close one with the composer Frédéric Chopin. But as time passed, Delacroix's party life diminished. Work demanded more hours, and his production was prodigious. For years after, those British masters of historic and romantic myth would people his canvases.

Then, in 1832, he was invited to join a diplomatic party dispatched to Morocco on a royal goodwill tour. It was a five-month stay, with brief stops in Spain and Algeria. The impact on his work was profound and enduring. In his youth, Delacroix had studied the works of Peter Paul Rubens, whose canvases were to be seen at the Louvre, and he had drawn his flamboyant style and rich palette heavily, if not exclusively, from that Flemish master of the Baroque. Now, in the northern reaches of Africa, there were new discoveries to be made in color and light, and in the look of the dignified, romantically costumed people who differed so sharply from his countrymen.

On Delacroix's return to Paris, memories of the visit provided a wealth of subjects, but what is astonishing is that he continued to draw on those few months for the rest of his life. For example, the show has 12 late works evoking Morocco and Algeria. One of the last, *Arabs Skirmishing in the Mountains* (opposite), was finished in 1863 when Delacroix was in a perilous state of health, suffering from the tubercular infection of his larynx that would soon end his life.

The Riding Lesson (1855) was praised by critics as a "marvel of color and spiritual grace," but Delacroix had difficulty selling the painting for his asking price.

The painting pictures a Bedouin family in a desert landscape of great beauty.

Those battling Arabs are what we think of as a typical Delacroix subject—all thunder and blood. More surprising is the tranquillity of several other evocations of long-past Moroccan days. One, *The Riding Lesson* (left), approaches the definition of cute. When it was shown in 1855, the critics, seldom unanimous about Delacroix's more violent imagery, were in raptures. It pictures a Bedouin family in a desert landscape of great beauty; a pleased young mother sits to the side, watching as her husband gives their young son his first instructions in the saddle. There is also a pet dog looking on. To be sure, it's from the hand of a master, but it takes little imagination to envisage the painting illustrating a children's book about life in Bedouinland.

What survives, according to one authority, are at least 800 major paintings, perhaps 1,000 small and minor paintings, and some 6,000 drawings.

Two brief foreign voyages would provide him with subject matter for a lifetime. The state's payment for his *Massacre* picture financed a three-month visit to England in 1825. He may have acquired some English before the trip, and may even have read bits of Byron and Scott. But there was more of the works of these masters to be found on their native ground, and there was the seduction of Shakespearean theater.

Rishel says that one of the reasons for concentrating on the late period in the exhibition was that in his final years Delacroix repeated subjects, often obsessively and always with a slightly new view of the event. These were not multiple images of haystacks or incessant views of Mont Sainte-Victoire—those obsessive landscapes would come from the next generation of artists. What sent Delacroix to his

Delacroix painted the golden sunset of *The Sea at Dieppe* from memory, though it has the appearance of a direct study. Its broken brushstrokes anticipate Impressionism.

easel was the *event*. In Philadelphia, for example, we see four variations of the Crucifixion (he painted more), and each portrays the savagery of death on a cross from a different angle and in different colors.

Over a period of 14 years, Delacroix painted at least six versions of *Christ on the Sea of Galilee*, four of them to be seen in Philadelphia. The theme is unchanging: a boatload of panicked disciples making their way through a treacherous storm. Sometimes the little boat has sails that are being torn and carried off by the wind. Through it all, Christ peacefully naps. In a moment, He will awaken and, as Matthew, Mark and Luke tell us, will calm the turbulent waters and then ask his followers, "Where is your faith?"

Where Delacroix's faith was cannot be said with certainty, but his imagination was in flight. The wind-whipped water never looks the same, ranging in color from a menacing midnight green to a sickly shade that suggests the unease produced by a churning sea. Each painting shows the same sleeping Christ and the same frightened passengers; each is subtly or dramatically altered.

Looking at those multiple versions of a single event, the museum explorer must wonder whether Delacroix, aside from any possible financial motivation, was aiming for an ideal effect never achieved to his satisfaction, or was simply playing brilliant games with light, color and form. He is, after all, the man who once wrote, "Artists who seek perfection in everything are those who cannot attain it in anything."

A contemporary critic once accused Delacroix of painting with a "drunken broom." But the young artists who looked at his work and learned from it were not hunting for textbook perfection. Delacroix's surfaces had a somewhat unfinished quality that would later be rendered in coarser terms in the work of the Impressionists. In fact, Delacroix's technique of applying paint in agitated and fragmented stabs of color would become a hallmark of that school of artists.

"We all paint through him," Cézanne once announced. Perhaps "all" is too comprehensive, but the territory occupied by the artists who were influenced by Delacroix is considerable. Toward the end of a modern book on the master are two pages of copies of his works painted by some of the most famous artists of the 19th and 20th centuries, in the years when they, like many young artists, were learning by imitating.

The copiers included Cézanne, Van Gogh, Renoir, Degas (who collected Delacroix), Manet, Redon and Picasso (who turned out no fewer than 15 versions of Delacroix's *Women of Algiers*). Their source had once declared that "the primary merit of a painting is to be a feast for the eye." Eugène Delacroix was surely smart enough to know that a generation of artists would sup at his table.

A frequent contributor, the author last wrote for SMITHSONIAN *on Monet, in July 1997.*

This assignment started in a flea market and ended in a national shrine.

This class boat trip to Ellis Island actually began at a flea market in Rhode Island, where ninth-grade teacher Maureen Whalen Spaight bought a package of old immigrant photographs for $3.00. Later, she had each of her students pick one of the photos and develop a character based on it.

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The Stran

"I am Dr. James Murray of the London Philological Society and Editor of the *New English Dictionary*. It is indeed an honor and a pleasure to at long last make your acquaintance—for you must be, kind sir, my most assiduous helpmeet, Dr. W. C. Minor?"

ge Case of the Surgeon at Crowthorne

BY SIMON WINCHESTER

ILLUSTRATIONS BY ROBERT GANTT STEELE

POPULAR LEGEND HAS IT THAT A MOST REMARKABLE CONVERsation took place on a misty autumn afternoon in 1897, in the small English village of Crowthorne. One of the parties to the colloquy was the formidable James Murray, the then editor of the *Oxford English Dictionary*, or, as it was called in its early days, the *New English Dictionary*. On the day in question Murray had traveled 50 miles by train from Oxford to meet an enigmatic figure named Dr. W. C. Minor, who was among the most prolific of the thousands of volunteer contributors whose searches into word origins and meanings were crucial to the dictionary's creation. For very nearly 20 years these two men had corresponded regularly about the finer points of English lexicography. But, so the story goes, they had never met. Dr. Minor never seemed willing or able to leave his home at Crowthorne, never willing to come the 50 miles up to Oxford. He was unable to offer any kind of explanation, nor do more than offer his regrets.

Murray, who himself was rarely free from the burdens of his work at his dictionary headquarters, the famous Scriptorium in Oxford, had long wished to see and to thank his mysterious and intriguing helper, particularly so by the late 1890s when, with the dictionary well under way, official honors were being showered upon all its creators. Murray wanted to make sure that all those involved—even one so apparently bashful as Dr. Minor—were fully recognized for the demanding work they had put in. Murray decided that he would pay a visit. "If the mountain would not come to Mahomet, then Mahomet would go to the mountain."

Accordingly, he telegraphed his intentions to Dr. Minor, noting that he would find it most convenient to take a train that arrived at Crowthorne Station just after 2 o'clock on a certain Wednesday in November. By return wire, Dr. Minor said that would be fine; the great lexicographer was indeed expected and would be made most welcome.

At the railway station a polished brougham and a liveried coachman were waiting, and with James Murray aboard they clip-clopped back through the lanes of rural Berkshire and at last drew up outside a huge and rather forbidding red-brick mansion. A solemn servant showed him into a grand and book-lined study, where behind an immense mahogany desk stood a man of undoubted importance. Murray bowed gravely, and launched into the brief speech of greeting that he had so long rehearsed:

"A very good afternoon to you, sir. I am Dr. James Murray of the London Philological Society, and editor of the *New English Dictionary*. It is indeed an honor and a pleasure to at long last make your acquaintance—for you must be, kind sir, my most assiduous helpmeet, Dr. W. C. Minor?"

There was a brief pause, an air of momentary mutual embarrassment. A clock ticked loudly. There were muffled footsteps in the hall. And then the man behind the desk cleared his throat, and spoke:

"I regret, kind sir, that I am not. It is not at all as you suppose. I am in fact the superintendent of the Broadmoor Criminal Lunatic Asylum. Dr. Minor is most certainly here. But he is an inmate. He has been a patient here for more than 20 years."

William Chester Minor, the man whom Murray visited at Crowthorne, was an American. In 1897 he was 63. Born of American missionary parents on the island of Ceylon, he had spent his teenage years in New Haven, Connecticut, gone to Yale, and later qualified as a surgeon. But a distinctly unkind fate eventually brought him to England and placed him in Broadmoor—a grim place still standing today—which had been built shortly before he arrived. It was then the pride and joy of those doctor-scientists who were still called "alienists," eventually to be restyled as clinical psychiatrists. Minor was in Broadmoor because he was quite mad, and because he had committed a murder in London in February 1872.

The crime was as shocking as it was unprecedented, for it was one of the few murders in London to involve the use of a firearm. The killing, trial and punishment also provide an astonishing early look at a subject that has lately much preoccupied American courts: the relation between murderous intent, high intelligence and insanity. The killing actually took place around 2:30 one moonlit

Saturday night in the run-down Lambeth section of London. Three or perhaps four shots rang out. They were loud, very loud, and they echoed through the cold and smokily damp night air. They were heard and instantly recognized by a young police constable named Henry Tarrant.

When Tarrant heard them he ran toward the sound and met Minor, who was holding a gun. Seizing the murder weapon Tarrant asked, "Whom did you shoot at?" "A man," said Minor. "You don't suppose I would be so cowardly as to shoot a woman?" Two other policemen appeared, and were sent to look after the dying man. A few onlookers began to collect. Blood was gushing onto the pavement—staining a spot that for many months afterward would be variously described in London's more dramatically minded papers as the location of a "Heinous Crime," a "Terrible Event," an "Atrocious Occurrence" and a "Vile Murder."

Seizing the murder weapon, Tarrant asked, "Whom did you shoot at?" "A man," said Minor.

The man who died, a Wiltshire farm laborer named George Merritt, has since been almost obliterated by the wash of history. He was one of many country folk who had lately been lured to industrialized London in search of work. He was married to a farm girl named Eliza and had seven children. (Eliza was pregnant with an eighth.) He worked in Lambeth as a night stoker at the Lion Brewery (the landmark lion of which still stands today, outside Waterloo Station). It was pure accident that walking to work so early on that cold morning, he came across, of all people, an American with a gun—an American tormented by a curiously insane belief.

The American was William Minor. In his deranged mind, he thought George Merritt, an utterly innocent stranger, was actually a vengeful Irishman bent on doing him sinister, even unspeakable, harm—an Irishman, as he saw it, who needed to be shot dead in self-defense. To understand these grim and bizarre doings requires taking a look back into William Minor's own tragic history, as the English courts promptly did.

Minor appeared, at first, to be one of fortune's favorites, rich, intelligent and of good family. After Yale he joined the Army—the Union Army, which, the year being 1864, was

fighting the Civil War. After a few months' training in a Connecticut hospital, he served as an assistant surgeon in the Northern army, and was sent into battle against the Confederates.

He was by all accounts a sensitive man. He read a good deal, painted in watercolors, played the flute. Perhaps not the ideal candidate to handle the rough and bloody work of war, he was particularly ill-prepared to deal with the dreadful slaughterhouse known as the Battle of the Wilderness.

The battle began when General Grant's army crossed the Rapidan River and ended, after just 50 hours, with 25,000 dead and wounded. The rifle fire was so thick and so close that it not only killed men but cut off whole trees at shoulder height and set the Virginia underbrush afire. Hundreds and hundreds of men, the wounded as well as the fit, were burned to death.

The "ammunition trains exploded," one soldier wrote; "the dead were roasted in the conflagration; the wounded ... dragged themselves along with their torn and mangled limbs, in the mad energy of despair, to escape.... It seemed as though Christian men had turned to fiends, and hell itself had usurped the place of earth."

Many of the men caught up in the battle happened to be Irish—men who, suffering from famine across the Atlantic, migrated to America and got work as soldiers in the Union Army for $13 a month.

Scores of soldiers had begun to desert. Desertion, the high command decreed, must be stopped. Not by execution; the ranks were too thin to permit so many men to be literally stricken from the rolls. Instead, deserters were to be humiliated, then returned to the line; punished, and sent back into the fight.

Dr. Minor takes the red hot branding iron and presses the glowing metal onto the deserter's cheek.

Anyone leaving his post would be subjected to savage official abuse, the aim being to make sure he didn't desert again. A deserter could, for example, be gagged with a bayonet, the blade tied across his open mouth with twine, or be suspended by his thumbs.

In some cases—and this was deemed a perfect combination of pain and humiliation—deserters were branded, the letter *D* seared into a cheek, or chest or buttock. Regulations became quite specific on this point—a letter an inch and a half high could either be burned on with a hot iron, or cut with a razor and the wound then filled with black powder, to cause irritation and indelibility.

Branding, it was claimed at William Minor's London trial, was what the young doctor had been forced to do. It is easy to imagine the situation. An Irish deserter, convicted by a drumhead court of running from the terrors of the Wilderness, is sentenced to be branded. The officers of the court decide that the new acting assistant surgeon, this fresh-faced and genteel-looking Yalie, should carry out the punishment. It will be as good a way as any, the older, war-weary officers imply, to introduce Dr. Minor to the rigors of war. And so the Irish deserter is brought to him, arms shackled behind his back.

He is exhausted and frightened. He is dirty and unkempt. His uniform is torn to rags by a frantic, desperate run through the brambles. He wants to go back home to Ireland. He begs for a chance to see his family again. He may expect one day to use what soldiering skills he has learned in Grant's army to fight against the British occupiers of his homeland.

Doubtless he pleads with the court; he pleads with his guards. He cries, he screams, he struggles. But the soldiers hold him down, and Dr. Minor takes the red-hot branding iron from a basket of glowing coals hastily borrowed from the brigade farrier. Minor hesitates for a moment—a hesitation that betrays his own reluctance. The officers grunt for him to continue—and he presses the glowing metal onto the deserter's cheek. The flesh sizzles and steams, the prisoner screams and screams.

And then it is over. The wretch is led away, holding to his injured cheek the alcohol-soaked rag that Minor has given him. Perhaps the wound will become infected, will fill with the "laudable pus" that other doctors have said hints at cure. Perhaps it will fester and crust with sores.

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THE OFFICIAL NETWORK OF EVERY MILLENNIUM

Perhaps it will blister and burst and bleed for weeks.

By any accounting such a man would have ample reason to want, one day, to wreak his revenge on the man who tortured him.

In the end Murray accumulated a ton of such paper contributions—millions of small cards.

As for William Chester Minor, the vision of this Irishman would haunt him for the rest of his life, filling his nights with waking nightmares, paranoid visions of vengeful spirits bent on exacting horrible retribution. He grew fearful of all Irishmen—imagining that not only his branded victim but the man's friends and relations and colleagues were after him. Indeed, he thought every Irish man jack in creation would come in the night, find him and, as he put it, "abuse him shamefully." All because he had been ordered to inflict so cruel a punishment on one of their number in America.

If that seems far-fetched, it was suggested during his trial that sometime after the branding, William Minor began to spiral downward into madness. He was steadily to become a sufferer from what in those days was called dementia praecox, what modern-day medicine defines as schizophrenia—though whether a branding would exacerbate this condition long term, is doubtful. In any case, he became delusional, violent, suspicious. He began to have horrible dreams in which, night after night, "people" would wake him and transport him to distant seraglios where he would be forced to perform unnatural acts with men, young children, animals. Today he could go into therapy, or be treated with sophisticated, psychotropic drugs, such as risperidone, which allow some schizophrenics to function with fair normality in society. Back then there was almost nothing that could be done for him.

He retired from the Army, though not before fighting for and winning a lifetime pension from the authorities—fellow officers who, in a kindly way, agreed that his illness doubtless had been contracted in the line of duty, as a result of war. So Minor became a veteran, sickly and with shattered nerves, because of service to his country. It was in this sadly afflicted condition that Minor was sent by his parents to England. They wanted him to settle down, to live life at a slower and more untroubled pace, to paint, to mingle with great minds, to try to redeem himself. They had a friend who knew the great art critic and drawing master John Ruskin, and they equipped their son with a letter of introduction to him, the better to gain entry to the English capital's beau monde.

Instead, for reasons that no one was able to elucidate, Dr. Minor took rooms in the lowest and meanest parts of London, possibly to gain easy access to women of the night. And when he killed a man, he said that the man was one of the Irish who loomed so large in his persecutional delusions. George Merritt was the soon-forgotten victim; his murderer, the court decided, was a man who must be put away for the rest of his life in Broadmoor Asylum, locked up in a cell overlooking the green Berkshire countryside. He was to be detained, the authorities decreed in the sentencing language of the time, "During Her Majesty's Pleasure."

And there Minor would have rotted away for the remainder of a lifetime, except that one day in the summer of 1880, he came across a slip of paper tucked into a book that he had ordered from a library in London. "An Appeal for Readers," the paper was headed. It was an invitation for interested and scholarly people to help in assembling an ambitious publication in progress at Oxford University and eventually to be called the *New English Dictionary*, the biggest expository collection of English words and their senses that had ever been created in the history of the English language.

Minor was intrigued. He had plenty of money and long since had established connections with bookstores by mail. He was himself a considerable reader and book collector. A model inmate during the day, and an inmate of means, he was allowed to occupy two cells in Broadmoor's relatively relaxed Cell Block Two, one of them equipped as a library. (In the other room, in which he slept, he had had the floors covered with zinc—to keep the demons from coming up through the floorboards at night.) A manservant helped him organize his books.

Astonishingly, he had also forged a relationship with

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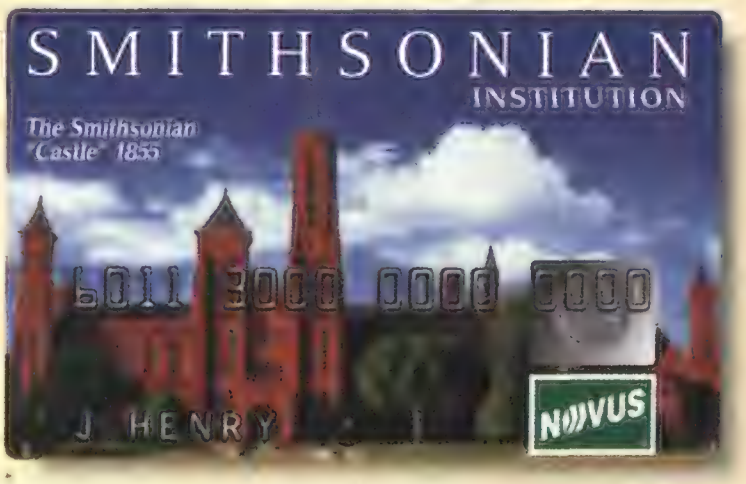

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young Eliza Merritt, the widow of the man he had shot dead. She said she had forgiven him—not least, it is perhaps cynically appropriate to remark, because, by way of apology and reparation, Minor had settled some money on her and her children.

Eliza was allowed to visit him. Minor persuaded her to bring him antiquarian books from London.

Eliza was allowed to visit him in his cell every now and then. Minor persuaded her to bring him parcels of antiquarian books from the great dealers in central London. Since he was able to add to his library at will, he surmised after reading James Murray's "Appeal" that he was in an ideal position to become an invisible scholar, a constant contributor to this noble and redeeming dictionary project.

Off went a note to Murray, at the oddly named Scriptorium—the dictionary's headquarters, first in London's Mill Hill district, and then, for the remaining three decades until Murray's death, on the Banbury Road in Oxford. Minor gave his address merely as Crowthorne, Berkshire, and wrote to inquire if he might be able to help. He had a reasonable knowledge of 16th- and 17th-century English literature, he said. And he had a fair amount of time on his hands.

Murray said later that the letter from Crowthorne came very soon after the beginning of his work on the dictionary—probably 1880, or perhaps 1881. Dr. Minor, he was to write, "proved to be a very good reader, who wrote to me often. I thought that he must be a retired medical man with plenty of available time."

The work that Murray demanded of some thousands of volunteers was of a kind peculiar to the style of this pioneering dictionary. Murray and his predecessors had decided that each and every word in English, and each and every sense of each and every word, needed to be supported by an illustrative quotation. And that, if possible, the uses would include the earliest known in English and an example from each century thereafter. One of the first uses found of the word "pig," for example, was as a plural noun in Chaucer's *The Reeve's Tale*, from the 14th century: "And in the floor, with nose and mouth to-broke, They walwe as doon two pigges in a poke."

As the work progressed through the alphabet, readers like William Minor were supposed to scour all English literature and send in cards quoting findings and uses, for every meaning, every word, every variant form.

In the end the editors accumulated a ton of such paper contributions—millions of small cards, made up by thousands of volunteers not only from all over England and Ireland and Scotland but in some cases America as well, with handwritten notations and quotations and references culled from English-language books and newspapers and magazines written and edited from every century since the ninth, when a significant number of documents in English had accumulated.

William Minor was among the best and most assiduous of the contributors. He sent in cards by the score, by the thousand, eventually by the tens of thousands. Quotations, meticulously written and noted and bundled and annotated, cascaded from large brown manila envelopes out onto the desks of the subeditors at the Scriptorium, delighting Murray, and proving time and again that he had been right to believe in his strategy of finding volunteers—and especially volunteers of Dr. Minor's quality—as the best and most economical means of assembling his dictionary.

Each time Murray found himself basking in the pleasure of receiving yet another batch of contributions from the surgeon at Crowthorne, he would write back immediately, offering his thanks, suggesting that the good doctor might like to come up to Oxford and receive in person the thanks and admiration that his meticulous and perceptive labors deserved.

But the good doctor, as we know, never came. He dissembled. He made excuses about infirmity, shyness, the physical impossibility of his coming up to Oxford. And for years James Murray accepted it all as eccentricity, and shrugged his shoulders. Lexicographical volunteers were a rum bunch (one, Henry Furnivall, assembled rowing crews of buxom waitresses charmed out of a Hammersmith tea shop); if William Minor was a recluse down in Crowthorne, then so be it.

And yet, he was so good, so keen, so energetic—and so tantalizingly close. Murray really wanted badly to see him. The matter came to a head as a result of what has ever since been known as the Great Dictionary Dinner.

It was 1897, a Jubilee Year, the 60th year of Queen Vic-

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toria's reign, and Oxford was more than in the mood for a party. The dictionary was going well. The progress, faltering in the early years, had accelerated—the section from *Anta* to *Battening* was finished in 1885, *Battenlie-Bozzom* in 1887, *Bra-Byzen* in 1888. A new efficiency had settled over the Scriptorium. As the crowning glory, Queen Victoria had in 1897 "graciously agreed," as the court liked to say, that the whole dictionary could be dedicated to her. They had just completed Volume III—embracing the letters *D* and *E*.

An aura of majestic permanence had all of a sudden invested the dictionary project. There was no doubt now that it would eventually be completed—for since it had been regally approved, who could now ever brook its cancellation? The queen had done her part, so now Oxford, in high mood for celebration, decided it could follow suit. James Murray deserved to be given honors and thanks, and who more appropriate than the great man's adopted university to bestow them.

The university's new vice-chancellor decided that a big dinner—a "slap-up," to employ a phrase that the dictionary was to quote from 1823—should be held in Murray's honor. It would be staged in the huge hall at Queen's College, where by old tradition a scholar with a silver trumpet would sound a fanfare to summon guests in to dine. It would celebrate what the *Times*, on the day of the dinner, proclaimed to be "the greatest effort probably which any university, it may be any printing press, has taken in hand since the invention of printing.... It will not be the least of the glories of the University of Oxford to have completed this gigantic task." The evening would be a memorable Oxford event.

As indeed it was. The long tables were splendidly decorated. The menu might be forthright and English—clear turtle soup, turbot with a lobster sauce, haunch of mutton, roast partridges, Queen Mab pudding, strawberry ice, but like the dictionary itself, it was also flavored generously, but not too generously, with hints of Gallicisms: sweetbreads *á la Villeroi*, *grenadins* of veal, *ramequins*. There were no fewer than 14 speeches—James Murray on the entire history of the making of the dictionary, the head of the Oxford University Press on his belief that the project was a great duty to the nation, and the egregious Henry Furnivall—as lively and amusing as ever, he had taken time out from recruiting waitresses to go a-rowing with him—on what he saw as Oxford's heartless attitude toward the admission of women.

Among the guests, along with all the great and the good of the academic land, were some of the most capable and energetic of the volunteer readers. But not the most energetic of all, William Minor. He was invited, of course, but he never showed. His absence saddened James Murray,

more than at any time before. And so a few days later we approach the scene with which this story begins.

Though they may have met once before—Murray's letters suggest they probably did—according to legend their fateful first meeting occurred after the famous brougham ride through the lanes of Berkshire.

Whenever it happened, for both men the first sight of each other must have been peculiar indeed, for they were uncannily similar in appearance. Both were extravagantly bearded. Portraits of Minor have an air of avuncular kindliness; Murray looks much the same, but with a trace of the severity that might well mark a lowland Scot from a Connecticut Yankee.

Each man might have imagined, for a second, that, rather than meeting a stranger, he was stepping toward himself in a looking glass.

Over several years, the two met a number of times. By all accounts they got on famously—a liking that was subject only to Dr. Minor's moods, to which Murray became fully sensible as time passed. Murray often had the foresight before each visit to telegraph, asking how the patient

was; if Minor was in low spirits and angry, Murray remained at Oxford; if he was low and likely to be comforted, then Murray would board the train.

When the weather was poor, the two men would sit together in Minor's room—a small and practically furnished cell not too dissimilar from a typical Oxford student's room, and just like the room that Murray was to be given at Balliol College once he was made an honorary fellow. It was lined with bookshelves, all of which were open except for one glass-fronted case that held the rarest of the 16th- and 17th-century works from which much of Minor's dictionary research was being done. The fireplace crackled merrily. Tea and Dundee cake were brought in—one of the many privileges that the superintendent accorded to his now distinguished patient.

And so the years passed, the passion for English words uniting the two old men, the differing dynamics of insanity and anonymity and distinction dividing them.

The years passed, the passion for English words uniting the two old men, despite their differences.

But just at the turn of the 20th century, a terrible tragedy suddenly befell Dr. Minor, a savage self-mutilation, done, he felt, to remove him from sexual exploitation by the demons of the night. This wounding enfeebled him. His work for the great book began slowly to fall away. He seemed to lose interest, at a point meticulously noted by the stern editors at the press as occurring at the time he was gathering quotations for the letter Q.

Shocked and deeply concerned, James Murray suggested to members of the government—now that he had been knighted and showered with honors—that the old man ought to be released. Minor was in failing health, he said, and harmless. Whitehall's bureaucrats and Westminster's politicians should let him go back to America, to die among his own people.

It was not until 1910 that the government, wearied by Murray's badgering, agreed. It fell to the young Winston Churchill, as Home Secretary, to sign the papers granting Minor's release and, more out of formality than spite, order that he be deported, forever forbidden to reenter the United Kingdom. Back in Connecticut, the family agreed to provide an escort. Sir James Murray went down to Broadmoor to say fond farewells. He brought with him a court photographer, who would take a final portrait of the brilliant old volunteer: a sepia image that still speaks of scholarship and friendship, of wisdom and pain. It is somehow a very touching picture, cracked and frail and venerable, much like the subject himself.

In April 1910, the steamer *Minnetonka* left England, bearing Dr. Minor home to New York, in the company of his brother Alfred, who for years had borne up as well as he could under the knowledge that his brother was mad, but clearly not bad, much less dangerous to know.

It was years before he actually got home. His first stop was Washington, D.C., and what is now St. Elizabeths hospital for the insane. The American government consigned him there for nearly a decade before letting the family take him back to Connecticut, where he died at age 85 in the spring of 1920. (He is buried in New Haven's fashionable Evergreen Cemetery with a small brown sandstone marker on his grave.)

William Chester Minor's name appears, without a hint of his scandalous secret, in the preface to the *Oxford English Dictionary*.

This story has been adapted from Simon Winchester's new book, The Professor and the Madman, *published this month by HarperCollins. Robert Steele lives and works in San Francisco.*

A Long Shot Pays Off

500 YEARS LATE, BUT 56 HANDS HIGH

IN THE DAYS WHEN MILAN WAS ONE OF THE RICHEST AND most powerful city-states in northern Italy, its duke, Ludovico Sforza, liked to do things in a grand way. In 1482 he commissioned Leonardo da Vinci to create the biggest horse statue ever. Made to honor the duke's father, it was to be 24 feet high. Leonardo spent years sketching a great charger, eventually sculpting a full-sized model in clay and leaving notes about how to cast it—the bronze would weigh 80 tons! But then a French army threatened and the metal was needed for cannon. When Milan fell in September 1499, Leonardo fled. French archers used the clay horse for target practice. For more than four centuries it was lost to history.

Then a most unlikely thing happened. United Airlines pilot Charles Dent, a lover of Italy and an amateur sculptor, saw copies of the Leonardo sketches that had been rediscovered in Spain in 1966. Dent sculpted a rough clay model of Leonardo's charger, and resolved that somehow he would build the famous animal as a gift from the American people to the people of Italy. Such a horse looked like a 100-to-1 shot, but Dent persevered. He created an organization, Leonardo da Vinci's Horse, Inc., which raised $4 million. The job of making the horse was given to the Tallix, Inc., foundry in Beacon, New York. Charles Dent died in 1994, but the work went on, most recently under the direction of sculptor Nina Akamu (right), who created the eight-foot master model. From it, a larger, clay version was made and will be cast in bronze. On September 10, 1999, five hundred years to the day after the archers shot Leonardo's model to pieces, the bronze horse—broken down into seven manageable sections and flown for free from the United States by Alitalia—will take its place on a pedestal in the ancient city of Milan. —*Nancy Mohr*

Backed by horses, sculptor Nina Akamu holds one of the sketches that led to the model before her—and to the finished charger.

PHOTOGRAPHS BY ENRICO FERORELLI

Dent's group wanted the horse to be as accurate as possible. Scholars were consulted, works of art assembled. The charger was huge; ways had to be found to create it in easily transportable sections. In 1997 Nina Akamu and her assistants created the eight-foot clay sculpture from which the final plaster model was cast. This model's exact proportions were transferred (at a scale of 3.25 to 1) to the interior armature and mesh of various sections of the full-sized horse. Clay was added and surface details were replicated using pantograph-like enlarging machines. Bottom center and top right: Versions of the eight-foot model are perfected. Top center and bottom right: Workers transfer basic features from the smaller model to the final horse. Left: The rear section of the clay version, from which the bronze horse will be cast, gets finishing touches. Supported by a welded-steel armature on its pedestal in Milan, the completed horse will weigh 15 tons.

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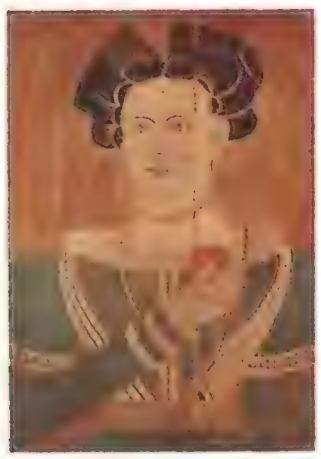
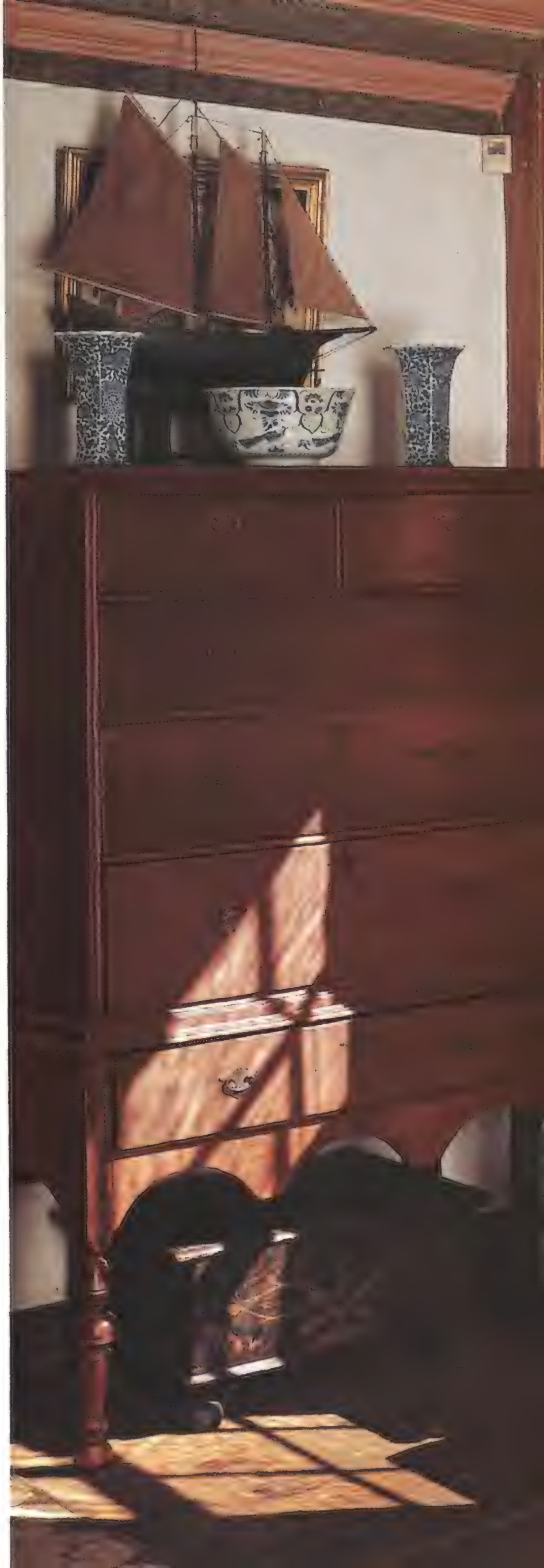
A Passion for the Past

BY DOUG STEWART

BERTRAM AND NINA LITTLE SPENT SIX DECADES AMASSING FOLK ART THAT CAPTURES A CORNER OF AMERICAN HISTORY



ONE OF THE SMALL PLEASURES of Cogswell's Grant, a quietly spectacular museum of folk art that opened last month in Essex, Massachusetts, is a colorful portrait (left) of a finely dressed woman of the early 1830s. Painted in oil, with traces of gilding, on two wooden boards, it is by an obscure Maine artist named A. Ellis. The woman's image is as symmetrical and stylized as a queen of spades. Her hair and hat resemble broken crockery. The rather stiff pose and expression, bloodless and tight-lipped, apparently suited the woman, one Diantha Atwood Gordon of Salem, New Hampshire. Nearly a century later, a granddaughter who'd often been left in the aging woman's care still seethed in recalling



Portraits, furniture and an array of small chests (Nina's particular passion) harmonize in an artful display of Americana in a bedroom at Cogswell's Grant.

The simple lines of the museum's 18th-century clapboard farmhouse are enlivened by the surprising, but authentic, pumpkin color chosen by the Littles (pictured below on the lawn in July 1973). The L-shaped wing at left was built by the couple in 1937-38.

her guardian's strictness. Once, the granddaughter recounted with great satisfaction, she somehow managed to lock both her grandparents in an outhouse, where they remained until evening.

Bertram K. and Nina Fletcher Little, the folk-art collectors who acquired the painting in 1961, rejoiced in gathering stories of this kind. They collected them as assiduously as they did the paintings and antiques with which they furnished their two Massachusetts homes. "Those who collect knowledge along with their teapots will seldom be downhearted and will never be bored," Nina Little wrote in 1939, referring as much to anecdotes about who used a teapot as to what influenced the shape of its spout.

After six decades of collecting, the Littles, both in their 90s, died just a few months apart in 1993. They left half their collection, the contents of their winter home in Brookline, on the outskirts of Boston, to be auctioned at Sotheby's. There it fetched a record-breaking $12.3 million (more than twice the presale estimate). The other half remains intact at Cogswell's Grant (above), the rustic 18th-century farmhouse where the Littles summered for more than 50 years. They bequeathed the house and its contents to the Society for the Preservation of New England Antiquities (SPNEA), which Bert Little headed from 1947 to 1970. An exhibition of 90 highlights from the extensive collection, "A Passion for the Past," recently traveled to six museums around the country.

The Littles were scholars as much as collectors. Nina in particular was a self-taught expert whose tenacious inquisitiveness and dogged work habits would shame a detective. In six books, more than 100 articles, and numerous conferences and exhibitions, Nina Little gave names and histories to hitherto anonymous painters, sculptors and craftsmen. In doing so, she brought to light whole new genres of American decorative art. "Nina discovered arts that were completely ignored by conventional art historians and museums," says Jonathan Fairbanks, a curator of American decorative arts at the Boston Museum of Fine Arts. "She found things that were different and exceptional, and she brought them into the mainstream of art history."

American folk art has been slow to win acceptance from the fine-arts establishment as something more than a flawed imitation of tonier stuff. Most 18th- and 19th-century folk art was fashioned by small-town artisans without formal training in the arts, and was usually of a utilitarian nature: weather vanes, tablecloths, rugs, pottery, blanket

Imagine not remembering your own daughter's name. For thousands of women each year, it's becoming a reality.

Alzheimer's disease—a major health issue for women. Alzheimer's disease is a devastating disease that takes an immense toll on people's lives. An estimated 4 million Americans have this degenerative disease that affects their ability to function normally and to remember who they are and the people and places they've known for decades. As the population ages, millions more will be afflicted with Alzheimer's disease in coming years. Alzheimer's disease may be more prevalent in women for reasons we do not understand. Some studies have suggested that estrogen loss during menopause may be a contributing factor, although this has not been proved. And certainly, women constitute the majority of caregivers for those who have the disease.

The special needs of the caregiver. Women who are family caregivers are often under a lot of stress. For this reason, it's important that they take special care of their health. Effective ways for managing stress include a healthy diet, adequate sleep and exercise and outside activities. Family members and caregivers are urged to contact their local chapter of the Alzheimer's Association for additional support.

A reason for hope. Rapid progress is being made in Alzheimer research. Drugs are available that may temporarily improve symptoms of the disease. Some preliminary studies suggest that other medications, such as estrogen replacement therapy (ERT), may make it possible to delay onset of disease symptoms, while offering other health benefits to menopausal and postmenopausal women. Other studies suggest that nonsteroidal anti-inflammatory drugs and vitamin E may offer some protection to nerve cells in the brain. The advantages of these treatments are that they are available now and the side effects are known and can be managed. As with taking any medication, you should first consult with your doctor.

More research is needed to determine whether these medications will prove to be effective treatments for Alzheimer's disease. But with your support, research will continue until this disease can be prevented.

Help is available. The Alzheimer's Association is dedicated to conquering Alzheimer's disease through research and to providing education and support to people with Alzheimer's disease and their families. To obtain the free brochure *Women and Alzheimer's Disease*, call 1-800-272-3900 or your local chapter or visit our web site: www.alz.org. Help is available for this serious health issue, so please call today. Do it for someone you love, do it for yourself.

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chests. The Littles preferred the term "country arts" but allowed that no single label was adequate for what Nina once called "our perhaps too diverse collection of Americana," most of it from 18th- and 19th-century New England.

Characteristically, the Littles named their summer home after poking around the Essex town archives and discovering that their property's original owner was a Jonathan Cogswell, who was granted the land by the town fathers in 1636. The present house, built in 1732 using chimneys from an earlier dwelling, sits secluded at the end of a country lane, surrounded by 135 acres of upland fields and an expanse of salt marsh periodically washed by flood tides. The property is still a working farm, operated by a couple who live in an ell attached to the rear of the main house. The building's clapboard exterior is an eye-catching pumpkin color, another characteristic Little touch: one of Nina Little's many influential findings was that Colonial homes were in fact much more colorful, inside and out, than even historians knew.

As a house museum, Cogswell's Grant appears virtually as it was when the Littles lived there: an artful, intimate jumble of New England history—some 2,000 objects all told—with not a spotlight or wall label in sight. On a recent visit, I'm struck immediately by the interior's quirky yet surprisingly uncluttered ambience. (Many of the Littles' treasures remain tucked away in drawers and cupboards.) The open shelves of a c. 1790 pine dresser are lined with New England redware, including a pie plate on which the potter felt moved to scrawl in large, flowing script: "A mince pie related with good brandy is one of the best dishes." A fireplace large enough for roasting an ox faces a dining table built from three ancient pine planks. Presiding over the room is an impressive portrait of an 18th-century Gloucester preacher in white wig and black robe, an index finger raised in admonishment ("Finish your pie!").

"This was a very livable house," says Richard Nylander,

the SPNEA's director of collections and exhibitions, as he shows me around. "Whenever you came here as a guest when the Littles were here, you felt comfortable." Open May through October, the house is unheated, and lighting is mostly natural, supplemented here and there by rustic table lamps made from jugs and bottles. Nylander opens a drawer at random and finds an antique wooden device shaped like a hand. The thumb swivels across the palm to the other side—a reversible mitten stretcher! "This is the type of offbeat stuff the Littles loved," he says.

Bright colors and strong personalities abound. Boxes, tall chests, and wall panels in several rooms are painted with

Nina's small office at Cogswell's Grant (right) features a collection of 19th-century New England schoolgirl watercolors and other artwork. The hooked "leopard" rug (top) dates from 1855-60. The sample gravestone (above) was carved by Noah Pratt of Maine.

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faux wood-graining, some of it dating from the 18th century. Despite the natural-wood aesthetic of the so-called Early American look, Nylander says that "in Colonial times, people covered up bare wood in their homes as quickly as they could." Grain painters, sometimes using crumpled wads of paper or leather to apply the paint, were happy to oblige. On the floor of a bedroom, an early 19th-century wooden trunk with a domed lid is decorated with a fanciful graining pattern, rich brown on golden yellow; the pattern resembles flower blossoms in some places, a nautilus shell in others. As part of its Historic New England program, the SPNEA has licensed handcrafted reproductions of more than a dozen pieces of early painted furniture here, including a country apothecary's chest, a red-painted pine tea table with a marbleized top, a floral-decorated "Bible box" and a maple highboy festooned with exuberantly painted plumes of black and ocher meant to resemble burled walnut, a more valuable wood.

Dominating the sitting room are Rufus and Hannah Lathrop, painted by John Durand in the 1770s. The couple first met (according to Nina Little's researches) at a minister's tea a few miles from here. Rufus' self-confident visage includes a large and faithfully rendered mole with hair; his young wife has an incipient double chin. Accuracy, not flattery, was the purpose of folk portraits, as the Littles well knew. In days when people died young and cameras didn't exist, family portraits were cherished documents. Hannah Lathrop died just 13 years after her portrait was done. In a letter Nina located, Rufus wrote not long after Hannah's death: "I am proud and gratified to have seen in this picture a good likeness of my wife while in her best health." If her chin was a little fleshy, so much the better.

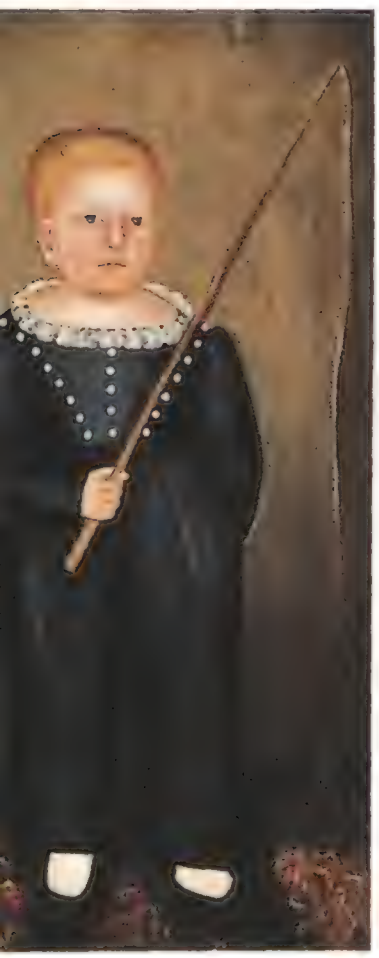
In another room hang five grim-faced portraits (below) of the McArthur family of Limington, Maine, painted in 1836 by Royall Brewster Smith. The three McArthur children are as watchful and burdened-looking as their parents. Though the Littles loved the matched set, the McArthur clan evidently did not. The paintings lay stashed in a closet at the family home in Limington, unframed, from the 19th century until shortly before the Littles bought them in 1957; even in the early days, it seems, folk art was not to everyone's taste. After acquiring the portraits, the Littles journeyed to Limington with the zeal of long-lost heirs; there they photographed the McArthurs' gravestones and discovered, among other things, that the two boys later fought on opposite sides in the Civil War.

Portraits of the dour-looking McArthur family of Limington, Maine, were painted by Royall B. Smith in 1836. From left: Sarah Prince Miltimore McArthur; her husband, Arthur; sons Arthur and William; daughter Harriet. The clockface (opposite) dates from 1800-25.

Nearby is an early 19th-century landscape, originally a painted wall panel from Bridgewater, Massachusetts. Its

idiosyncrasies are part of its charm: the meteorologically peculiar cirrus clouds in a red, yellow and green sky, the sponged-on foliage of the trees, the row of impossibly craggy mountains in the distance that seem lifted from the Sung Dynasty, if not Dr. Seuss. Simpler, but equally dramatic, a crane decoy (p. 114) worthy of Picasso stands in the entry hall. Its long neck and single leg are lengths of broomstick; its head is a small wooden ball. Made around 1907, it was designed to be taken apart quickly and carried by a hunter (who used it to lure game birds, not cranes).

The Littles were ahead of their time in keeping their furniture and art as they found it, neither stripping nor retouching it. "They maintained their collection, but they didn't scrub it," says Nylander as I take in the timeworn surfaces around me. On the wall, the nearly bare wood of a weather vane's rooster is as rough as corned beef, bearing only traces of red paint around the comb. This was part of the appeal of such things, Nina wrote, "evoking many years of battling the elements on church steeple or barn." As for domestic objects, I imagine in the patterns of wear the routines of past lives: the paint on a rocking chair rubbed off by generations of rocking bodies; the penciled numbers above an 1821 clock's Roman numerals that helped a dad or mom teach the kids to tell time.



Like good archaeologists, the Littles collected in context. They sought objects in groups that had never been dispersed, or they worked to reunite them after the pieces had parted company. Near a portrait of a ship named the *Victory* is a row of ivory carvings the ship brought home from China; upstairs is a painting of its captain's house in Annisquam, a few miles from here. The Littles also acquired the ship's logbook, the speaking horn used on deck and some Chinese paintings of the captain's daughters.

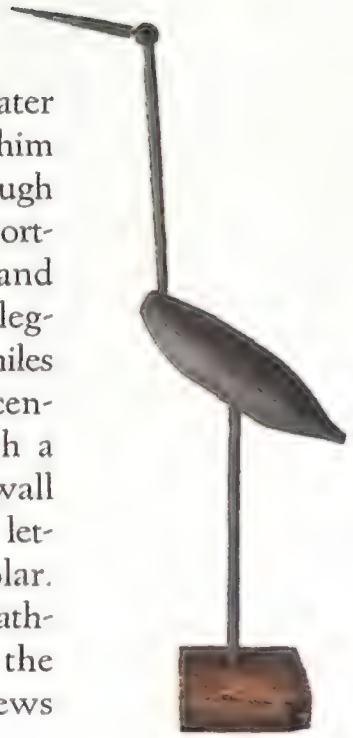
"This is a very 20th-century confection," Nylander explains as I examine a bed rug and a row of decoys. The SPNEA owns 24 historic house museums in five New England states; the organization's trademark is a staunch adherence to historical authenticity. Cogswell's Grant, by contrast, showcases not an era but an impulse: the Littles' passionate, often whimsical devotion to collecting. Says Nancy Carlisle, the SPNEA's curator of collections, "Cogswell's Grant shows how one uses things of the past to create a fantasy that's founded in the present. A Colonial house wouldn't have looked like this in a million years."

Part of the fantasy is the house's dimly lit attic, which remains as the Littles left it, and is not open to tours. Standing under hand-hewn oak beams, I peer at antique boxes, shelves of china, a cigar-store Indian, assorted chairs and baskets, tallow candles on a rack. Somewhere in a corner, I've heard, there's an open pine coffin, but I'm content not to find it. Another evocative space is Nina Little's tiny study, off the sitting room downstairs. I imagine her under the framed watercolors, jotting notes or making polite inquiries on the Depression-era black rotary phone.

Actually, the study at Cogswell's Grant is as much a fantasy as is the carefully arranged attic. Nina Little was a formidable researcher, and when she worked, she required elbowroom. Her real study was a two-room research center at the couple's rambling winter home in Brookline. Here were vast quantities of alphabetized card files, research notebooks, photographs and, hidden discreetly behind a door under a staircase, more than 100 linear feet of bookshelves. "Reference books, then as now, were a girl's best friend," she wrote of her earliest collecting days in her 1984 memoir, *Little By Little*.

She and her husband shared the detective work. Nina kept long lists of research questions and marked color-coded initials next to each to specify which of them was to track down the answer. Though Bert worked full-time in

Boston (first in the publishing industry, later managing the SPNEA), his wife would give him lunchtime research chores: burrowing through old documents at probate court perhaps, or sorting out family trees at the New England Genealogical Society. Their legwork was legendary. Together, they'd drive hundreds of miles across New England to interview the descendants of a portrait subject or photograph a derelict house from which a decorative wall panel had come. "One visit is better than 10 letters!" Nina once wrote to a young scholar. Stumped as to why an odd 19th-century weather vane they prized had been carved in the shape of a snake, Nina found period news



reports of a likely cause: the sighting of a "sea serpent" in Gloucester Harbor on August 14, 1817. Consulting a Portsmouth, New Hampshire, business directory from 1827, she determined that a clockmaker whose piece they had acquired also advertised his services as a dental surgeon. (If you were good with tiny tools, why not?)

Many of the provincial artists whose work the Littles collected were unschooled itinerants, but not every provincial artist was incapable of academic-style work, Nina discovered. Some produced fine art and folk art, depending on the customer. An 1831 newspaper ad placed by William Matthew Prior of Bath, Maine, offered two prices for his portraits on cardboard: "Per-

The intimate ambience of an upstairs bedroom is reinforced by the warm tones of the wood, the canopy beds and cradle. The overmantel painting is by Winthrop Chandler, an 18th-century artist championed by Nina. A one-legged crane decoy (above) is from 1907.

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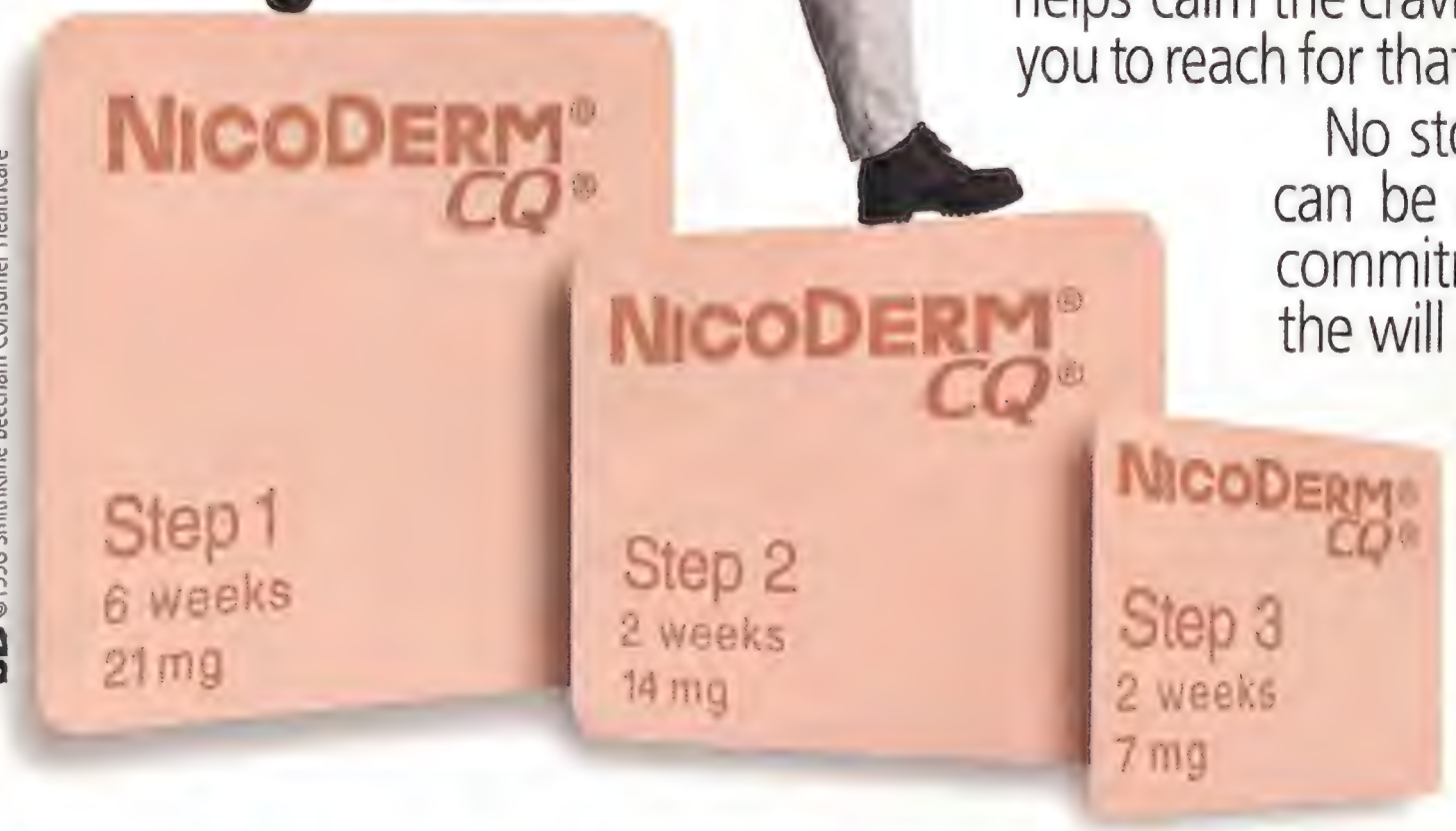

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sons wishing for a flat picture can have a likeness without shade or shadow at one quarter price"—$2.92 including frame and glass. Apparently a savvy merchandiser, Prior talked his Portland barber into sitting for a portrait and wrote on the back, "painted for three months' shaves."

Souvenirs of African trading voyages, these 19th-century decorated ostrich eggs bear images both familiar and exotic.

The Littles' limitless curiosity could raise eyebrows. Prior to World War II, they acquired an unusually detailed mid-19th-century painting of the Portsmouth Navy Yard. "Wishing to identify the various buildings and to ascertain if any still remained," Nina wrote, "we presented ourselves one summer day at the entrance to the navy yard, with the painting under an arm. With the naiveté of the enthusiastic collector, we had neglected to arrange an introduction." The officer who greeted them clearly viewed the picture as a map of the military installation, "and he questioned us closely about where we had obtained it." Nina felt sure they would be detained and their "map" confiscated (or so she wrote). Taking advantage of a distraction, she and Bert made their getaway.

Over the years, Nina's wide-ranging expertise and curiosity shifted from questions triggered by the Littles' own collecting to broader issues in American decorative-arts history. She published books on old houses, early American mural paintings and decorated walls, floor coverings, bed hangings, and carved and decorated boxes, as well as a string of monographs on overlooked artists and genres. She lectured regularly at professional forums and became *Antiques* magazine's most prolific contributor. For Sturbridge Village, she pioneered the idea of furnishing a period house museum not with nostalgic knickknacks but with the same items found in the probate inventory left by the home's long-gone occupants. For the opening of Colonial Williamsburg's Abby Aldrich Rockefeller Collection of Folk Art in 1957, Nina—who'd been invited to write the 400-page catalogue—quietly persuaded David Rockefeller to buy back 14 pieces from his mother's collection that the Metropolitan Museum of Art then owned, including Edward Hicks' *Peaceable Kingdom*.

Despite her influence, Nina Fletcher Little never held a professional post, never even attended college. She was born in Brookline in 1903, the strong-willed but ladylike granddaughter of a wealthy Rhode Island textile manufacturer. Bert Little, whom she married in 1925, was a witty, outgoing native of Salem, where his great-grandfather and namesake, Capt. John Bertram, had owned a fleet of clipper ships active in the China trade. In good New England fashion, the young couple avoided showy indulgences. For weekends away from Boston, they bought a tiny, unrestored cottage in Hudson, Massachusetts, that lacked plumbing, heat, electricity and telephone. The young antiquarians would fantasize they were living in 1825. Nina learned to prime a pump, wash dishes for company with a single kettle of hot water, and keep the fire stoked so tomatoes didn't freeze on the shelf.

At first, the Littles collected to make their cottage more livable: their first purchase was an antique oil lantern to help them get around after dark. Bert's cousin by marriage, Edna Little Greenwood, lived close by in a farmhouse crammed with country antiques and folk art (much of it is now in the Smithsonian's National Museum of American History as the Greenwood Collection). The elder woman began taking the Littles to country auctions and out-of-the-way shops, since high-style antiques and even reproductions cost more than the couple was willing to spend.

Historically minded homeowners of the 1920s commonly placed an old spinning wheel in the parlor, a warming pan by the hearth and, over the mantel, a ship in a bottle. The Littles, however, had no use for the quaint. "I am more inclined to go in for the unusual," Nina wrote a friend in 1959. The pieces they were drawn to were apt to be offbeat and brightly decorated, even gaudy, and they tended to come with a story.

The first clock they bought had stood in the same spot in a Gloucester home since the clockmaker, Simon Willard, put it there in the 1770s. The inscription —"Warranted for Capt..."—was incomplete because by the time Willard rode out from Boston to deliver his $7\frac{1}{2}$-foot timepiece, the sea captain who had commissioned it had run out of money. Willard then tried peddling the clock door-to-door and found a buyer not far away in Capt. Nathaniel Webber. Webber's ceilings were lower than his fellow mariner's, so the clockmaker removed the decorative eagle on top. The eagle remained in storage for 160 years, until the Littles brought the clock and eagle together.

Fortunately, Nina kept notebooks in which she carefully entered details like these for each object she and Bert

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bought. To the pieces themselves, she attached jelly-jar labels. "Nina was legendary for them," says Christopher Monkhouse, an old friend, now a decorative-arts curator at the Minneapolis Institute of Arts. On them she recorded the date, price and provenance, and any other facts that would fit. "Nobody could get as much information on a jelly label as Nina could."

In 1937, with three children and a fast-growing collection, the Littles bought Cogswell's Grant. The family didn't tiptoe around the furnishings. Nina called the children in to meals with a foghorn salvaged from a Grand Banks schooner, and everyone ate off transfer-printed "old blue" Staffordshire china. "They used everything in the house, but they did so with care," says Abbott Lowell Cummings, a former Yale historian and preservationist, now retired, who knew the Littles well. "When you were in a room with Nina, it never occurred to you to take off your shoes. You'd hold your cup gingerly. You sat in a chair delicately. She commanded respect and good behavior just by her presence."

The Littles liked to collect in context and displayed this painting of the *Victory* near the ship's logbook and speaking horn (top).

Nina's father used to complain there wasn't a comfortable chair in the place, but the Littles' circle of art-minded friends—dealers, curators, historians—relished the salon-like atmosphere there. "It was always a learning situation," says Gilbert Vincent, now director of museums for the New York State Historical Association.

In later years, as folk art grew in popularity and price, the Littles were no longer picking things up at country auctions; they relied instead on dealers who knew their tastes. Nina Little's championing of unknown provincial artists, of course, played a role in driving up their prices. Winthrop Chandler, for example, was an itinerant housepainter, portraitist and jack-of-all-trades in Colonial Connecticut whose distinctive paintings Nina helped lift from obscurity. Moreover, in Chandler's decorative wall paintings and those of other itinerant artists, Nina identified a flourishing American landscape-painting tradition that predated the Hudson River school by nearly a century. An obituary she unearthed from 1790 noted Chandler's impoverished end: "His genius was not matured on the bosom of encouragement. Embarrassment like strong weeds in a garden of delicate flowers, checked his enthusiasm and disheartened the man." Perhaps he died too soon. In 1994, a Chandler overmantel landscape for which the Littles paid $500 in 1948 sold at Sotheby's for $596,500.

Despite their insider status in the art world, the Littles were frugal Yankees at heart. Cummings was riding with the couple one day when they pulled up to a tollboth and Bert began fishing coins out of a decrepit leather change purse he always carried. The purse suddenly ruptured, leaking quarters onto the car floor. "Bert," said Nina, "Have you thought of taking that to your cobbler?" Once Nina waited all afternoon for a house auction to thin out before offering a winning bid of 40 cents for two ostrich eggs with elaborate engravings. For larger purchases, Bert was sometimes a brake on Nina's acquisitiveness. In Brookline, she brought home a pair of arresting portraits by Ammi Phillips of Joseph and Sarah Dorr, c. 1815, now hanging at Cogswell's Grant. Knowing that Bert would object that their home had no wall space left, Nina hid the paintings in a bedroom for a few months. To a friend she fussed, "If I listened to Bertram K. Little I wouldn't own a thing!"

In their later years, the Littles were visited at Cogswell's Grant by the local tax assessor, according to Boston curator Jonathan Fairbanks. "He sees all this worn-out furniture, cracks in the ceiling and, my gosh, a soapstone sink!" Fairbanks laughs. "The assessor figures, 'These are crotchety old people living in a decrepit place. There's nothing new here.' And he reduces the assessment! Bert used to rub his hands with glee in telling that story."

The author, a frequent contributor, lives in Essex County not far from Cogswell's Grant with furniture that's just old.

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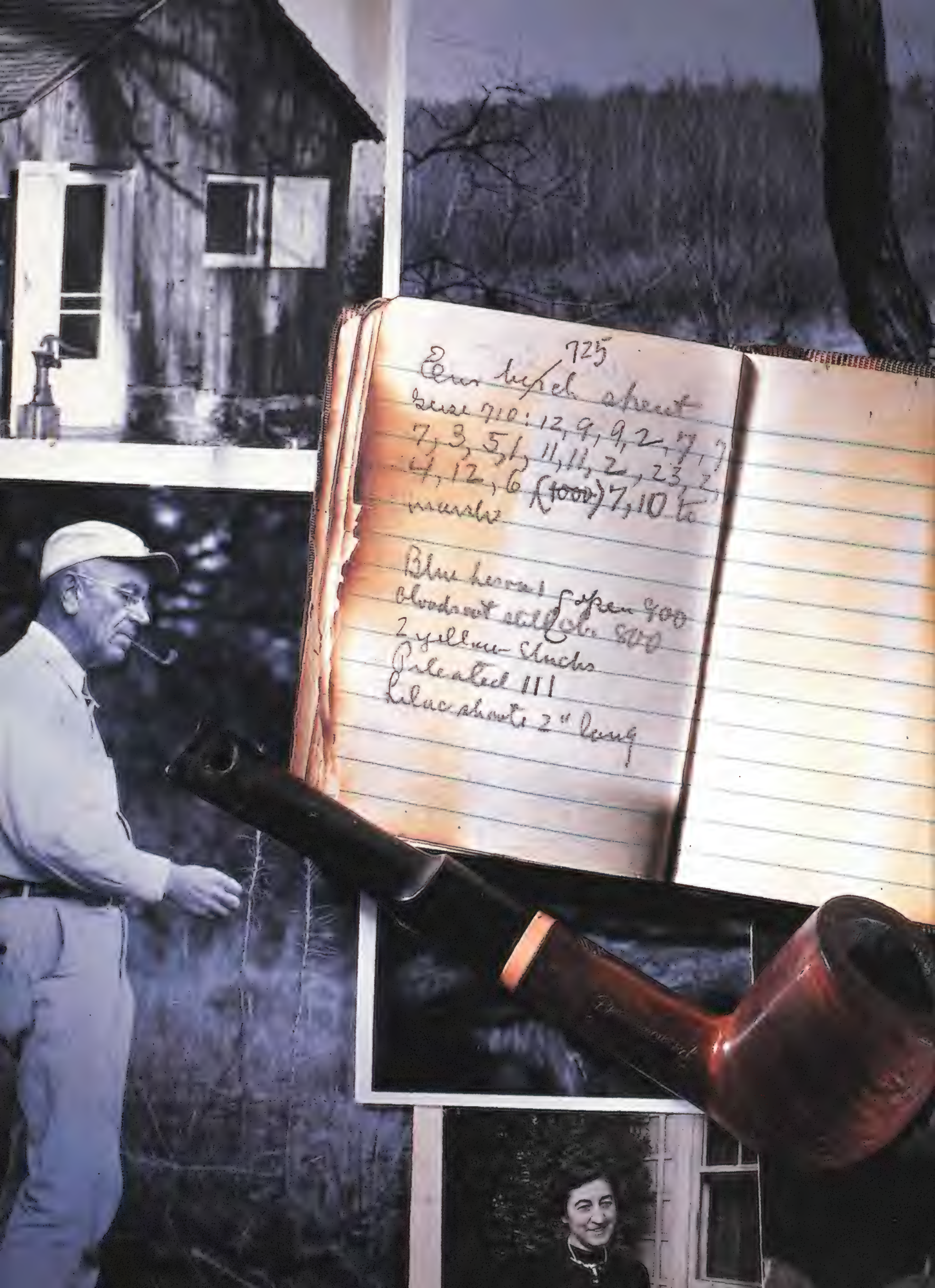
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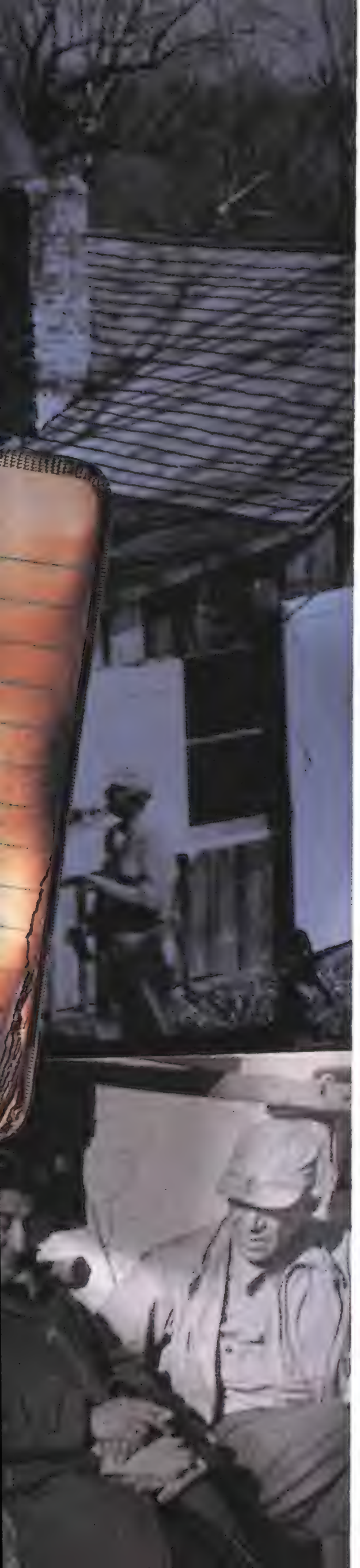

ALDO LEOPOLD ARTICULATED A NEW WAY TO LOOK AT THE LAND AND ITS CREATURES

A Sage For All Seasons

BY DONALD DALE JACKSON

ON APRIL 14, 1948, ALDO LEOPOLD learned that a collection of his essays about nature and conservation had been accepted for publication by Oxford University Press. His daughter Nina Bradley remembers he was thrilled. "He'd been on a Presidential commission, but that wasn't as big a thing as getting the book accepted." The working title was *Great Possessions*, but it was published the following year as *A Sand County Almanac*.

A few days after getting the good news, Leopold, his wife, Estella, and their youngest daughter, also named Estella, drove to the family's getaway "shack" on the Wisconsin River near Baraboo, about 40 miles north of their home in Madison, Wisconsin. Leopold had bought the shack and 120 acres of used-up land in 1935. In the years since, the couple and their five children had hunted and fished, swum and canoed there, planted thousands of Leopold's beloved pines, and carefully noted the comings and goings of plants, birds, mammals and seasons. And Leopold had artfully used the property as a setting for the observations he transformed into vivid, jewel-like essays.

The three Leopolds settled onto a bench on the evening of April 19 to watch one of the exciting rituals of spring—the return of the geese to their marsh. Aldo and his wife happily punched each other as the gabbling flocks dropped down on the water one after another; the total number of birds was nearly 800. He had written of their nonstop conversation: "Finally some deep honker has his last word, and the noise subsides to that half-audible small talk that seldom ceases among geese."

He spent the early morning of

Leopold's pipe and notebook, singed by the fire he was fighting when he died, overlie photographs of the "shack" and wife Estella.

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A young Leopold, far left, and his survey crew honor the tradition of insulting the camp cook at the Apache National Forest in 1910.

April 21 as he did every morning at the shack, recording sightings of buds, flowers, tracks, birds and other phenomena while he sipped coffee. At midmorning, spotting smoke coming from a grass fire near a neighbor's house, he drove over to help. He sprayed the edges of the fire with a pump strapped to his back while his wife worked another side of the fast-moving blaze and his daughter went to call the fire department. When they didn't see him for more than an hour they began to worry. A neighbor found him on his back, arms folded across his chest, the pump on the ground beside him: dead of a heart attack at 61.

The tiny notebook that Aldo Leopold carried in his shirt pocket when he died is stored now in an envelope with other material in the voluminous Leopold Collection at the University of Wisconsin—Madison Archives. The $2\frac{1}{2}$-by-$3\frac{1}{2}$-inch plaid notebook is slightly charred from the flames that brushed over Leopold's body. The entries, written in pencil in his tidy, minute handwriting, include shopping lists, notes to himself and the inevitable nature notations. "Bloodroot" appears on the last, black-edged page, then "pileated" with the Roman numeral "III" beside it, and finally "lilac shoots 2" long."

When he died a half-century ago, Leopold was a recognized leader in what was then a low-profile and little-understood conservation movement, and his name was far from a household word. A forester, wildlife expert and University of Wisconsin professor who described himself as an "ecologist" in an age when Americans had only the dimmest notion of what such a creature was, Aldo Leopold was an environmental visionary-with-portfolio who happened to come along perhaps two decades before his time. In a writing style that grew more literary and less polemical as he matured, Leopold argued eloquently for a "land ethic"—and the individual and collective sacrifices such an ethic entails—long before green became a fashionable color.

As with most neglected prophets, his rewards came posthumously. The suddenly potent environmentalists who discovered Leopold in the 1960s embraced *A Sand County Almanac* with the fervor of true believers. His book was required reading in colleges, its sales topped a million and the number of printings surpassed 40 by 1987. "It was unbelievable," says his son Carl, a renowned botanist at Cornell. "The sales increased every year from 1950 to 1995 before they finally leveled off." Leopold's name recognition may have tapered off among the general public in recent years, but you wouldn't know it from the man-seeking-woman ad that appeared in a Wisconsin newspaper not long ago: "Middle-aged man," it read, "interested in Vivaldi and Aldo Leopold, seeks interested female."

Like most of us, Leopold bristled with apparent contradictions. He was an avid hunter who worked to protect many species of animals; an early foe of wolves and grizzlies and other predators, he evolved into a defender

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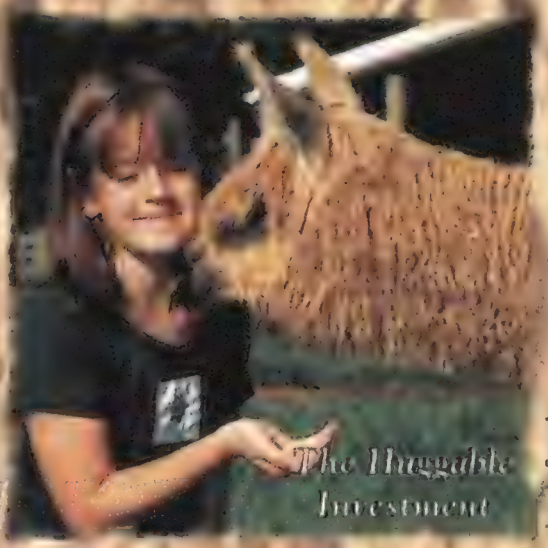

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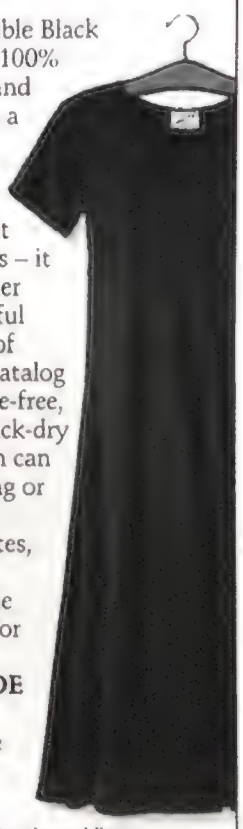

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of the same beasts in the name of what is now called biodiversity. He was arguing for wilderness before most people knew it was disappearing, but he recognized the irony in setting aside untouched areas for recreation. He was a soaring idealist and a down-home pragmatist who wrote in the foreword to the *Almanac* that "one must make shift with things as they are." He could be arrogant and headstrong; he could also be considerate and unselfish. He was a man of both thought and action who could write a book and build a fireplace. Perhaps most important, he was a Middle American who lived most of his life between the coasts, in Iowa and the Southwest and Wisconsin. "My father was Midwestern," his son Carl says. "He spoke with a flat accent. He was self-contained and independent. And he believed in democracy."

He campaigned tirelessly against the overgrazing that led to erosion of the Southwest's thin soils.

Leopold was an outdoors-minded high achiever from the beginning. Born in the Mississippi River town of Burlington, Iowa, in 1887, he spent his early years in a spacious, high-ceilinged mansion perched on a bluff high above the river. His father, a successful desk manufacturer, took him on hikes and duck-hunting outings to marshes along the Mississippi. Aldo was the oldest of four in a close-knit German-American family, and he was his mother's favorite. At 11 he was already listing the 39 birds he'd identified in his yard and noting that he favored wrens because they "do more good" and "sing sweetly."

His parents sent him to Lawrenceville prep school in New Jersey, where he dutifully wrote home several times a week describing his "tramps" in the countryside and sometimes enclosing leaf samples. In a school essay recounting one such trek, he pledged his fidelity to the American landscape: "Give me my native land at all hours of the day, all seasons of the year, and for all the years of my life," he wrote. ("Why exclude the rest of the world?" his teacher asked in the margin.) Leopold must have meant it, because he made only one visit to another continent in his lifetime (Europe in 1935), and didn't much care for it.

Pronounced "sturdy, intelligent and well-balanced" by his headmaster, he moved on to Yale in 1905. He had already zeroed in on forestry as a career—in a school essay titled "The Maintenance of Forests" he blasted the lumber industry for its "mad race for [the] dollar"—and Yale offered a master's degree in its new forestry school. "He started out as a loner at college but he enjoyed it," says Curt Meine, author of a meticulously researched biography of Leopold. "He felt separate from his schoolmates." A Lawrenceville friend had dubbed him "The Old Naturalist." The Yale yearbook listed his extracurricular interests (YMCA, Iowa Club, debating society) and said that his motto was "To hell with convention."

But perhaps not in the way he

Leopold affected the full cowboy regalia in his early days out West (left), but by 1938 he was down to a bow and arrow.

dressed. The earnest nonconformist acquired an Ivy League taste in clothes, which he retained most of his life. Shortly after graduating in 1909, he asked his brother Carl, who was still at Yale, to go to Rosenberg's clothing store and get him a pair of cords with two watch pockets, some "cream-white silk shirting" for handkerchiefs and a meerschaum pipe.

Leopold was a cocky 22 when he went to work for the U.S. Forest Service in the Southwest, first in the Apache National Forest in the Arizona Territory and later in the Carson National Forest in New Mexico. He outfitted himself with horse, carbine, rope and batwing chaps, but leading a timber survey crew in hard mountain country proved tougher than suiting up. He got lost several times and antagonized veteran crewmen by bluffing and exaggerating his woods savvy. He wrote home that the men grumbled too much, "damn their whining souls"; the crewmen later charged him with incompetence.

But that shaky baptism neither discouraged him nor thwarted his advancement, which was relentless. He loved the work, reporting to his mother that "it is more than . . . a mere livelihood; it is service and glorious service too." "I think he learned some humility in the Southwest," Meine says. "He came in on his high horse, thinking he could control things, then he screwed up." He also fell in love with Estella Bergere, a member of a wealthy and politically powerful New Mexico ranching family of Spanish descent. They were married in 1912.

Leopold began to focus on the environmental issues that would become major threads in his career. One was game management. In a letter to his Yale class, he talked about raising game on land unfit for livestock. He organized hunters and lobbied so successfully for careful management of game species that ex-President Theodore Roosevelt sent him a fan letter. Leopold campaigned tirelessly against the overgrazing that led to widespread erosion of the Southwest's thin soils. He also began thinking about wilderness policy, writing his first article on the subject in 1921 and drawing up the plan for the first Forest Service wilderness area, established in the Gila National Forest, in New Mexico, in 1924.

He subscribed to the widely held view in those years that wolves, mountain lions and other predators were bad. In a 1915 article called "The Varmint Question," he argued that predators "eat the cream off the stock grower's profits." But an experience he had during his tour in the Southwest would eventually change his mind. He had helped kill a female wolf on a riverbank. "We reached the old wolf in time to watch a fierce green fire dying in her eyes," he wrote a long time after in *A Sand County Almanac*. "I realized then, and have known ever since, that there was something new to me in those

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Iron Keeps Food Fresh

By Yoshihiro Ogawa

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About the Author:
Yoshihiro Ogawa graduated from the Faculty of Engineering at Yamaguchi University. He is a director of the Technical Engineering Division at Nittetsu Fine Products Co., Ltd., part of the Nippon Steel group, which produces and sells oxygen absorbers.

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Estella shares a happy moment with, from left, Luna, Starker and Nina Leopold.

eyes—something known only to her and to the mountain. I was young then, and full of trigger-itch; I thought that because fewer wolves meant more deer, that no wolves would mean hunters' paradise." It was an opinion he later renounced.

He rose in the Forest Service until he was chief of operations for the Southwestern district. He had a reputation as an adequate administrator with a touch of the maverick about him, and had already spurned transfer to headquarters in Washington, D.C. He cranked out a stream of articles and speeches, many of them technical but others taking a progressively broader conservation perspective. In 1924 he accepted a transfer to become assistant director of the service's Forest Products Laboratory in Madison. But he was miscast in a job that focused on tree product research rather than the forest, and he quit after four years to write and to work as a game and forestry consultant. His letterhead offered expertise in "game surveys, game management, game research and conservation policy."

A chronic notetaker, he began to collect quotes he fancied, entering them in notebooks that ultimately turned up among his papers at the University of Wisconsin. One quote from Robert Louis Stevenson said that "to hold the same views at 40 as we held at 20 is to have been

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He aspired to show that an overworked farm could be restored to ecological vigor.

stupefied for a score of years." Another Stevenson passage reflected Leopold's own stolid work ethic: "Restfulness is a quality for cattle. The virtues are all active." A passage from the Roman writer Cicero helps explain why he never stopped writing: "It is doubted whether a man ever brings his faculties to bear with their full force on a subject until he writes upon it."

Leopold was evolving into the extraordinary blend of talent and interests he would eventually become, the scientist/teacher/outdoorsman/philosopher/poet. He could already gather a head of literary steam on the subject of conservation. He wrote at the end of his first book, the largely technical *Game Management* (1933), that "twenty centuries of 'progress' have brought the average citizen a vote, a national anthem, a Ford, a bank account, and a high opinion of himself, but not the capacity to live in high density without befouling and denuding his environment, nor a conviction that such capacity, rather than such density, is the true test of whether he is civilized."

The Leopold children—Starker, Luna, Nina, Carl and Estella—were born between 1913 and 1927. The family lived near the University of Wisconsin campus, coincidentally just two doors from the historian Frederick Jackson Turner, who had explained the importance of the frontier to the American character. Aldo and wife Estella learned archery—she won the Wisconsin women's championship five years in a row. He was a craftsman who made his own bows and arrows and even his own glue. But he could sometimes miscalculate: "He decided to build a rowboat in the basement one time," son Carl recalls. "It looked fine, but when he finished, it wouldn't fit through the door. We finally had to take out windows and sills and some cement to get it out."

The Leopolds frequently listened to classical music on the radio after dinner, and the children all played guitar. He was a low-key father who didn't push his kids. "I remember him calling me outside once when I got a D-minus in German," Carl says. "He just said, 'What's this about German class?' No scolding; he left it to me to think about. The only time I remember being punished was when Nina and I were roughhousing while he was gluing feathers on an arrow. He put us in a closet." The children remember Aldo and Estella as devoted to each other. "There was complete consideration on both sides," Nina recalls. "We grew up thinking all marriages were like that."

Leopold's personal style was always somewhat professorial—he was even-tempered, a pipe smoker partial to well-tailored tweeds—and in 1933 he became a professor of "game management" at the University of Wisconsin. The department name has changed with the times, metamorphosing to "wildlife management" and later to "wildlife ecology." During most of his tenure, which continued until his death, Leopold was a one-man faculty, designing and giving courses, leading field trips and counseling graduate students. When he bought the shack near Baraboo, it provided both his weekend escapes and his literary legacy. ("Sand County" refers to the local soil, the residue of an Ice Age lake.) He aspired to show that an overworked, carelessly tended farm could be restored to ecological vigor. When the family first saw it, the shack was a one-room ex-chicken coop still knee-deep in manure and surrounded by what Nina described as "corn stubble, cockleburs, broken fences and blowing sand." They added a bunkhouse, a fireplace and an outdoor privy christened the "Parthenon" because Starker, who

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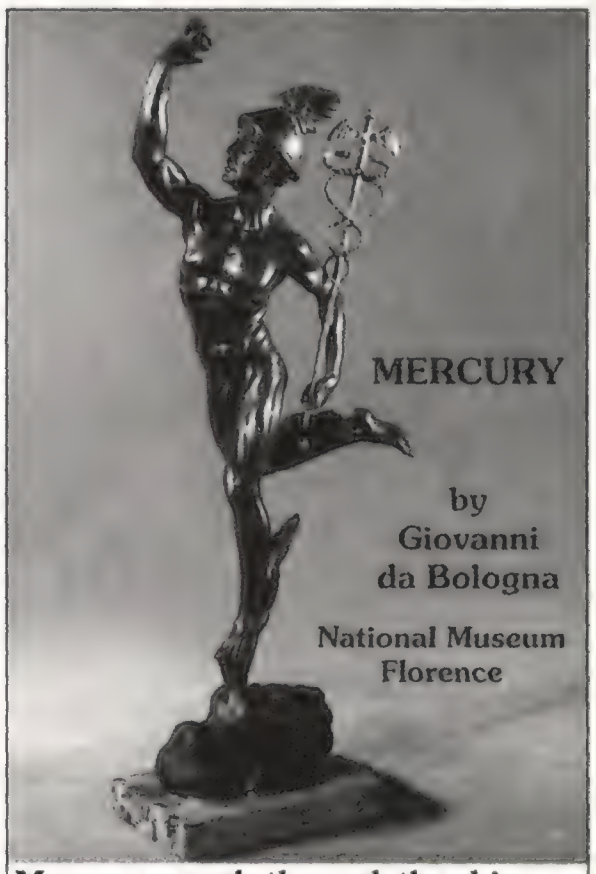

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ENDLESS POOLS

Leopold assesses the growth of a red pine tree, one of thousands the family planted at the shack.

built it, declared that it was as handsome as the Parthenon. They gathered driftwood from the banks of the Wisconsin River a few yards away and planted pine seedlings by the thousands every spring. "I love all trees," Leopold once wrote, "but I am *in love* with pines." Shack time was family time. "We had kerosene lamps and a Dutch oven, no electricity," Nina recalls. "Dad would bring his writing material but never used it."

The same year that he bought the shack, Leopold made his lone trip to Europe, a three-month-long visit to Germany to study forestry and wildlife management. The major impression he brought back home was of an overmanaged, tamed and controlled nature, which he attributed to a "passion for unnecessary outdoor geometry." The absence of variety robbed the woodlands of exuberance, he felt: "I never realized before that the melodies of nature are music only when played against the undertones of evolutionary history."

He was now an outspoken advocate of wilderness, and when Bob Marshall (SMITHSONIAN, August 1994) and other conservationists formed the Wilderness Society in 1935 they invited Leopold to become its president ("I request, urge and implore you," the hard-to-refuse Marshall pleaded). Leopold deftly deflected the invitation but agreed to be a founding member. He saw wilderness as a kind of anvil of American character. The hallmarks of our culture, he argued, derived from our pioneer past—"vigorous individualism combined with ability to organize, a certain intellectual curiosity bent to practical ends, a lack of subservience to stiff social forms, and an intolerance of drones."

A trip to the Río Gavilán country in the Mexican state of Chihuahua the following year forced him to reexamine his idea of wilderness once again. Here was a place with few human tracks, its original diversity intact, "near to being the cream of creation." It was in the Sierra Madre, he wrote, that he "first clearly realized that land is an organism, that all my life I had seen only sick land, whereas here was a biota still in perfect aboriginal health." He would subsequently stress the link between biodiversity—predators now included—and the health of the land.

Leopold took to teaching as if he'd been doing it all his life, which in a way he had. His approach was authoritative but personal. He liked to interview students with a mix of factual and personal questions: What are your main outdoor interests? Can you name five species of woodpeckers found in Wisconsin? Where do you fish for trout? He had what one student called "command presence, a certain tall-in-the-saddle air," despite his 5-foot-9 stature. Many of his students went on to become outdoor professionals, including wildlife biologists and a forester. The aim of his Wildlife Ecology 118 course, he told his students, was to show that "this alphabet of 'natural objects' (soils and rivers, birds and beasts) spells out a

story" they could in time learn to read.

His ex-students put together a book of reminiscences of Leopold in 1988. One recalled how he taught them to study terrain, to identify tracks and understand why certain plants were present and others absent. Another student, impressed by his editing skill, called him a "glutton for clarity" who scorned the inflated professorial prose he called "College English." He did his own writing in his office, arriving several hours before classes began and composing with sharp pencils (he had no tolerance for dull tools, whether knives, shovels or pencils) on lined yellow pads. When he finished a piece, he often stashed it in the drawer of the Leopold Company desk he called the "cooler." "It doesn't change in there," he explained to another student, "but I do. When I get an idea or a new slant or a fresh view, why hell, it's right there."

Leopold's land ethic was emerging as a recurrent theme in his writing. "A thing is right," Leopold reasoned, "when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise." His son Luna, who became a respected geologist and hydrologist, believed this was an

A pioneer in game management, Leopold inspects a partridge-chick skin.

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"outgrowth of his deep concern for individual people." At dinner he often asked the children to discuss something "interesting" that happened to them that day. "He was trying to bring us out," Nina says. "We'd scrounge around trying to come up with something interesting." Her sister Estella, known to the family as "Baby Girl," took a college course from her father. "She raised her hand to ask a question and Dad said, 'Yes, Baby Girl,'" Nina remembers. "She was mortified."

He was a lifelong joiner who was forever chairing committee meetings, making keynote speeches or writing articles for various scientific or environmental groups. His most prestigious appointment was as a member of the President's Committee on Wild Life Restoration, a New Deal conservation initiative, but the post that would cause him the most anguish was that of the Wisconsin conservation commissioner. Leopold became controversial when he successfully argued for permitting deer hunters to kill does to reduce the herd, because the deer were overbrowsing their range. That generated a storm of vehement attacks on the "great Aldo" and "Leopoldian egotism." "It was a time I remember him being depressed," Nina says.

In 1941, an editor made the first suggestion that Leopold's nature writing had wide appeal.

The first suggestion that Leopold's nature writing might have a larger, nonprofessional audience came in an overture from an editor at Alfred A. Knopf publishers in 1941. The editor wanted a "personal" book of field observations "evocatively and vividly written." Leopold was interested, but three years elapsed before he submitted 13 essays, only to have the manuscript rejected as too diffuse. His friend and student Albert Hochbaum urged him to bare more of his soul in the book and to acknowledge the blood on his hands from the years that he campaigned for the elimination of all predators. Leopold's mea culpa is the essay "Thinking Like a Mountain," in which he ruefully describes killing the wolf and watching the green fire die in its eyes. "Hochbaum pushed him through his own ego," Curt Meine says. "He forced him to admit his mistake. After that it was like a dam bursting. His tone changed—there had been a distance from readers, but now he was more of a wise and gentle guide."

Leopold wrote steadily through the war years, increasingly focused on the book he was determined to see through to publication. His sons Luna and Carl both entered the armed forces, Luna in the Army and Carl in the Marines. Leopold's knowledge of birds helped him circumvent military security. "I was on Palmyra Island in the Pacific," Carl remembers, "and we weren't allowed to say where we

Leopold's beloved shack, an ex-chicken coop on the Wisconsin River, was a project, a getaway and, with the land nearby, the setting for *A Sand County Almanac*.

were. But I saw curlews there, the ones that migrate from the Arctic, and I mentioned them in a letter home. That's all Dad needed to figure out where I was."

Leopold's writing centered more and more on the cycle of life at his riverside retreat. There, he got up long before sunup, a habit that yielded some of *A Sand County Almanac*'s most sublime passages: "At 3:35 the nearest field sparrow avows, in a clear tenor chant, that he holds the jack-pine copse north to the riverbank, and south to the old wagon track. One by one all the other field sparrows within earshot recite their respective holdings.... the robin in the big elm warbles loudly his claim to the crotch where the icestorm tore off a limb, and all appurtenances pertaining thereto.... The indigo bunting on the hill asserts title to the dead oak limb left by the 1936 drought.... He does not claim, but I think he implies, the right to out-blue all bluebirds.... Half a dozen other wrens give voice, and now all is bedlam."

When the war ended, Leopold seemed to become despondent. "It was about what had happened in the world and where we were going, the idea that things were out of control," Meine says. "He was one of the few people thinking broadly about the future of the natural world and humanity's relation to it." Still he wrote, trying to fuse science and art, slowly finding his method in the deceptively simple evocation of natural phenomena—cranes, for example, in "Marshland Elegy": "Like the white ghost of a glacier the mists advance.... A single silence hangs from horizon to horizon.... On motionless wing they emerge from the lifting mists, sweep a final arc of sky, and settle in clangorous descending spirals to their feeding grounds. A new day has begun on the crane marsh."

He was a different man now. He had always been a knowledgeable advocate and a graceful writer, but in his last years he became something more—poet, philosopher or maybe just a wise man. "He evolved," his son Carl says. "He continually refined himself. When he left Yale he was dapper and spoiled and a classy young man. Later he was the professor in tweeds. But I think the shack transformed him, simplified him. I think in the final years he got down to the real wool."

In September 1947, Leopold underwent surgery for tic douloureux, a painful disorder of a nerve in the skull. He was bothered afterward by occasional memory lapses. That December, he submitted to Oxford University Press the manuscript that would become *A Sand County Almanac*. It was accepted a few months later. His work was done.

Frequent contributor Donald Dale Jackson last wrote on the Amistad mutiny.

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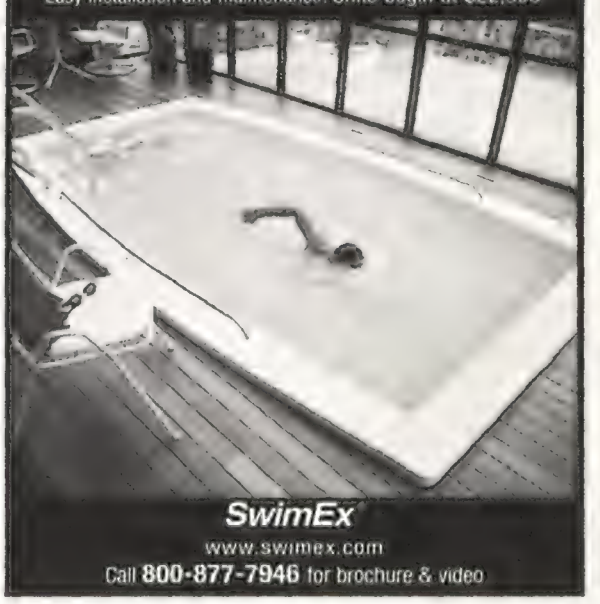

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Finally—a "cure" for bad breath!

For years, the cause of chronic bad breath has been misdiagnosed, but a dentist's research has led to TheraBreath™, a dramatic treatment system that works naturally and effectively.

by Jason Williams

These days, people spend a great deal of time on their health and fitness. Exercise, nutrition and an emphasis on general wellness are important to people not only for medical reasons, but for social ones as well. Everyone wants to feel and look their best. Unfortunately, many people around the world suffer from a condition that cannot be cured at a health club, spa or even a hospital: chronic bad breath.

It is estimated that over 80 million people worldwide suffer from bad breath, or halitosis. In the past, treatment has consisted of masking the odor with mouthwashes or mints, flooding the mouth with alcohol-based rinses, or the latest craze, popping pills that claim to cure the problem in the stomach. None of these treatments work, because halitosis is caused by bacteria on the back of the tongue and upper throat that produce sulfurous gases. The way to stop bad breath is to stop this process, and this is the secret behind the revolutionary TheraBreath™ system.

You're the last to know. Because halitosis originates in the mouth, it is virtually undetectable by your own sense of smell. You may notice a bitter, sour taste in your mouth or a whitish coating on the back of your tongue, but you generally find out there's a problem when a family member, friend or coworker brings it to your attention. At that point, you need an effective, long-lasting and easy-to-use method of eliminating the problem. Without proper treatment, chronic bad breath can lead to a loss of confidence and self-esteem, and it can even result in depression. The problem can adversely affect your marriage, social life, career and relationships with family members. What's needed is a quick and effective treatment that works naturally with no side effects.

A scientific solution. As a dentist with a degree in bacteriology, Dr. Harold Katz has been keenly aware of the widespread nature of this problem. It was not until his daughter came to him about her halitosis, however, that he began to research the problem in earnest. His studies led him to an amazing discovery about the source of bad breath: it does not originate in the digestive system, and the food you eat has no direct effect on your breath.

Certain foods, however, contribute to the production of sulfurous gases in the back of the mouth. Acids in coffee and proteins in dairy products exacerbate the problem. Mints and mouthwashes intended to mask or prevent bad breath actually worsen the condition because sugar and alcohol dry out the mouth. Many common medications for everything from high blood pressure to depression have the same drying effect, resulting in the formation of odorous gases. Mucous from post-nasal drip contains dense proteins that are full of sulfur. Some treatments for halitosis contain Sodium Lauryl Sulfate, which can cause canker sores. The only effective means of eliminating the sulfur gas production is to introduce oxygen to the bacteria, causing them to produce tasteless, odorless sulfates.

Effective, safe and natural. At his California Breath Clinic, Dr. Katz has perfected a five-step program for treating halitosis. By using these products on a regular basis, chronic halitosis sufferers can end their problem. The TheraBreath system eliminates the problem of bitter or sour taste in the mouth, improves general periodontal health and will even whiten teeth. Unlike mouthwashes that are flavored heavily or designed to taste like medicine, TheraBreath has a mild spearmint flavor that tastes great and creates pleasant, neutral breath. It contains no SLS compounds, so you will not suffer from an increase in canker sores or any other side effects. These products are all-natural and simply introduce a greater amount of oxygen into the mouth's chemistry.

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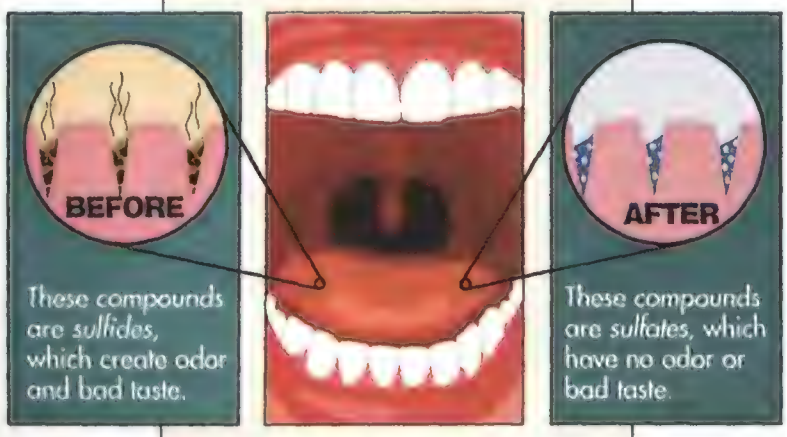
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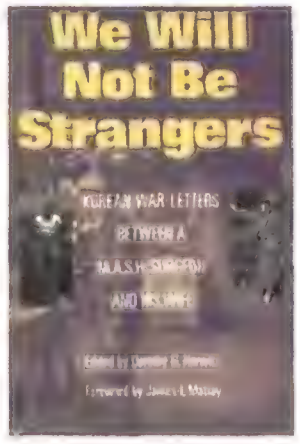
Here's what Mel's day was like on November 8, 1952: "Operating, finishing, picking another case . . . one a neck injury, another a leg, another a belly."

We Will Not Be Strangers
Dorothy G. Horwitz, editor
University of Illinois Press, $26.95

MEL AND DOROTHY HORWITZ, A couple of bright, articulate and upwardly mobile Jewish kids from Brooklyn, had been married a year when Mel quit his surgical residency in 1952 to serve a tour as a MASH (Mobile Army Surgical Hospital) doctor in the Korean War. They decided before he left, as couples in that predicament often do, to write each other daily and tell each other everything about their lives—what they were thinking and feeling as well as the most trivial details of their daily routine. Most of us don't manage to stick to a resolution like that, but Mel and Dorothy did. The result, a lifetime or so later, is this book, in which Dorothy edits their 600 letters down to perhaps 10 percent of what was their original weight.

It's not literature, but on its own terms it works. The reason is that what comes through most vividly is their passion—about the war and its mad, random inhumanity, about the issues of the day (like McCarthyism) and most of all about each other. These two were in love, I mean forget-about-it, all-ahead-full in *love*. What Leonardo DiCaprio and Kate Winslet felt on that big ship, you know the one, was a grain of sand to the Sahara of the love that Dorothy and Mel shared. They wanted to know everything about each other, preferably on a minute-to-minute basis; they enjoyed meditating on each other's more admirable parts. There are times, to be sure, when a sense of excess intrudes, and the reader feels like an inadvertent eavesdropper in a thin-walled motel. But you have to salute any couple who can sustain that level of ardent intimacy when they're 9,000 miles apart.



Dorothy was a schoolteacher on Long Island who studied dance and attended concerts in her spare time. Her letters, inevitably, are more prosaic: she rides the subway, comforts her newly widowed mother and counts the days to her reunion with Mel. The more political of the two, she mutters seditiously about the absurdity of the war, the absence of a defined American interest and the indifference of the U.S. public. In one letter she reports a journalistic experiment in which a newspaper ran the same Korea story on its front page, word for word, for three consecutive days; nobody noticed. Americans, save those who were sent there and the people like Dorothy who loved them, never seemed to become as engaged with Korea as we did with Vietnam, perhaps because the Korean War didn't have the television coverage.

Mel was meanwhile living the life of Hawkeye Pierce, minus all the fun and games with the nurses. His descriptions of a MASH operating room in action sound so much like the TV show that one expects Radar or Klinger to bang through the swinging door. In a way these letters illuminate the reality beneath the surface of the show, the gritty, emotionally draining grind that these doctors confronted daily. Here's what Mel's day was like on November 8, 1952: "Operating, finishing, going out to the pre-op ward, picking another case, one after another—one a neck injury, another a leg, another a belly. They lie there, some calling to one another when they come from the same outfits. 'Did you see him?' 'Did he make it?' 'No, he's dead.' Stories of men falling on grenades to save a platoon. I had thought they were only stories. Sometimes they live, more often they don't. . . . Kids, most of them, all reacting differently to the injury and the pain and the horror."

Mel was an idealistic doctor, eager for the opportunity to work in a MASH unit because that's where he could learn the most and do the most good. He was also skeptical about the U.S. presence in Korea and defiantly non-GI, again echoing Hawkeye. Disillusionment sets in early and deepens as the days away from Dorothy mount up. And it's not just the war or the separation—it's the Army, this "machine of men where they lose

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sight of the fact that men have souls, that there is something miraculous about the fact that a man lives. He breathes, walks, and thinks, yet to the army he is a screw, a bolt, a hinge to make the machine work." I remember feeling something very similar to that (and that was in the peacetime Army), but I've rarely heard it articulated so well.

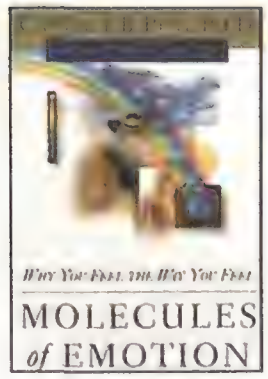
Mel's disgust with the war and its mindless carnage is forever spilling

Their book is invested with an appealing, down-to-earth modesty.

into his love letters. "I've had enough surgery, enough cutting out blasted bodies, torn muscles and shattered bones," he writes after four months of MASH duty. After another four, when he's a short-timer on the downhill slope to Dorothy, he can barely contain himself: "God I hate this business. Destruction. Waste of men, lives, money, time. I hate to work in a rubber apron as blood and dirt spills over me." For him, there is nothing more to learn in Korea.

Dorothy and Mel were reunited in Japan in April 1953, ten months after he sailed away. She adds a tantalizingly terse postscript on their subsequent life: four children, a second degree—in law—for Mel, a career as a teacher and writer for her. The impression that lingers is that these are ordinary folks who got caught in the clanking machinery of a Great Event, and who happened to be remarkably articulate in their reactions to it. For all its high-voltage passion, their book is invested with an appealing, down-to-earth modesty. This is one couple's story, they're saying, nothing more. And that's enough.

Donald Dale Jackson reviews books from his home in Connecticut.



Molecules of Emotion
Candace B. Pert
Scribner, $25

CANDACE PERT IS a brilliant molecular biologist who was a key figure in the discovery of the endorphin molecule, the body's natural form of morphine. She is now widely regarded as the mother of a new field of science known as psychoneuroimmunology (SMITHSONIAN, June 1989). Her research into brain biochemistry at the National Institute of Mental Health contributed to a radically new understanding of mind and body. In the 17th century, the philosopher René Descartes split mind and body into two spheres, with the body belonging to science and the mind left to metaphysics. Now Pert and her peers are rejoining what Descartes put asunder, by looking deeply into the molecular level of life.

In *Molecules of Emotion*, Pert offers a clear and often riveting account of her research on the frontier of a new kind of science. She also writes as an insider caught up in the politics of science, offering a rare glimpse of the ruthless competition for prizes and money that sometimes obscures the pursuit of truth. And, throwing aside the caution that is customary among scientists, she applies the new facts of psychoneuroimmunology to everyday life, discussing everything from drugs and disease to dreams and the molecular biology of hugs.

There are enough new facts, metaphors and speculations in this book to astonish (and sometimes raise the hackles of) many readers, just as Pert's research has often been met with initial disbelief. The field of psychoneuroimmunology, although based on exacting research, has had a hard birth. Its core idea is that the surfaces of cells are lined with many specific "receptors" to which only

specific molecules can attach themselves. These molecules, in turn, are messengers through which the body and mind, as well as our neurons, glands and immune cells, are all constantly sharing information.

The work of Pert and her colleagues showed that a variety of proteins known as peptides (including endorphins) were among the body's key "information substances"—and each of them could affect our mind, our emotions, our immune system, our digestion and other bodily functions simultaneously. For scientists and doctors trained to focus on one system in isolation from the others—a neuroscientist doesn't study white blood cells, for example—this came as

A reviewer sent back the comment: "This is preposterous, you must not be washing your test tubes well enough."

a shock. Their first reaction was to defend their turf, and also to deny the new evidence.

When Jesse Roth, clinical director at the National Institutes of Health, discovered in the 1980s that insulin (which was supposed to be produced only in the pancreas) was also made in the brain, as well as in one-celled organisms outside the human body, his papers were at first rejected by every reputable scientific journal. A reviewer sent back the comment: "This is preposterous, you must not be washing your test tubes well enough." When Ed Blalock at the University of Texas showed that immune cells were secreting endorphins (which Pert had discovered in the brain), he met the same kind of response. When his work was confirmed, the leading journal *Nature* warned scientists to beware of "radical psychoimmunologists" who would use Blalock's work to suggest that body and mind were in communication. Thereafter, Pert and her colleagues proudly called themselves radical psychoimmunologists.

Pert's own career has often been as controversial as the new science she's helped to create, and she writes of this with candor. She discovered endorphins as a graduate student, according to her account, only by secretly pursuing an experiment her professor had ordered her to drop. When he was later given the prestigious Lasker Award for work she had contributed to mightily, Pert was left out of the prize. She refused to keep quiet about it. The ensuing scandal made her something of a pariah to the establishment.

More recently, Pert and her husband, immunologist Michael Ruff,

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have devoted years of research to a potentially nontoxic cure for AIDS based on psychoneuroimmunology. They synthesized a peptide that would mimic the part of the virus that attaches to cell receptors and thus block the virus from entering a cell, instead of using toxic conventional drugs to destroy it. But their work has been dismissed, like other early advances in psychoneuroimmunology. It has only lately begun to gain interest and garner some backing among mainstream AIDS researchers.

"The brain is a bag of hormones," and those hormones affect not only the brain, but every aspect of body and mind. "The body is the unconscious mind!"

At its best, *Molecules of Emotion* is a lucid explanation of new research on the way peptides work to connect all aspects of body and mind in a network of shared information. To cite only a single example, Pert explains: "For decades, most people thought of the brain and its extension the central nervous system as an electrical communication system . . . resembling a telephone system with trillions of miles of intricately crisscrossing wires." But new research techniques for studying peptides and receptors show that only 2 percent of neuronal communications are electrical, across a synapse. In fact, she writes, "the brain is a bag of hormones." And those hormones affect not only the brain, but every aspect of body and mind; many memories are stored throughout the body, as changes in the structure of receptors at the cellular level. "The body," Pert concludes, "is the unconscious mind!"

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The central theme of Pert's book is that the peptides that flood our bodies are, in fact, the molecules of emotion. Emotions, largely ignored within the traditional confines of science and medicine, are actually the key to understanding psychoimmunology's emerging picture of how body and mind affect each other. For example, it's through the emotion-modulating peptides that an embarrassing thought can cause blood vessels to dilate and turn a face beet red. In the same way, the molecules of emotion can mobilize immune cells to destroy an incipient tumor. Techniques like meditation or visualization may also act as forces to set those molecules in action.

Pert's mission, as she describes it, is to bridge the gap that exists between the laboratory and the layman. "I try," she writes, "to make available and interpret the most up-to-date knowledge that I and my fellow scientists are discovering, information that is practical, that can change people's lives. In the process, I virtually cross into another dimension, where the leading edge of biomolecular medicine becomes accessible to anyone who wants to hear it."

Much of what Pert has to say is solidly grounded in new research, but she's on shakier ground in her occasional embrace of pop psychology and mysticism. Now a research professor at Georgetown University, she is as apt to speak at a conference of New Age gurus as at a gathering of molecular biologists. She is trying to open a dialogue between the mind of science and the body of beliefs many people are turning to for alternative healing. Whether these efforts represent critical lapses or welcome leaps of faith must be left to the perspective of each reader.

Paul Trachtman, who resides in New Mexico, is a regular contributor to SMITHSONIAN. *His most recent article, in the May 1998 issue, was a profile of the legendary horse trainer Buck Brannaman*

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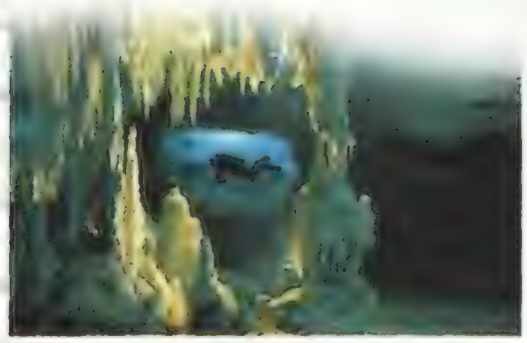

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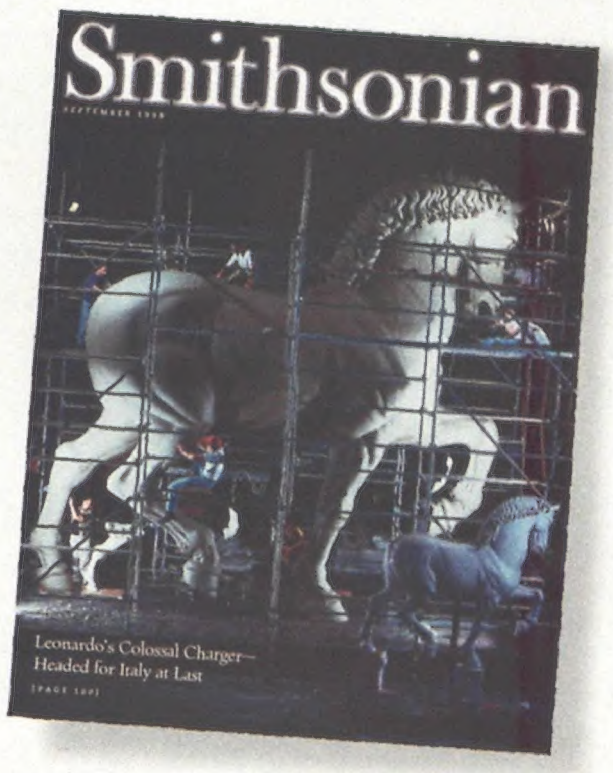

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THE LAST PAGE

My Answering Machine Sure Had Its Hang-ups

BY SEAN VERNON

A LONG-STANDING MEMBER OF MY household passed away recently following an extended period of malaise. His name was Hal, and I shall miss him, though it must be said there were many occasions when he and I very nearly came to blows. Of course, any scrap between us would have been completely one-sided. Hal, you see, was my answering machine.

I'm not the kind of person who names inanimate objects, the way some men name their cars or 9-irons, but I realized long ago that Hal had a mind of his own. Partly because he, too, prominently featured a small, red light (or "eye," as I liked to think), I named him after the Cyclopean supercomputer in Stanley Kubrick's 1968 film *2001: A Space Odyssey*. Kubrick's HAL attempts to kill his human overseers on board the spacecraft *Discovery* because he is convinced they have decided to pull his plug.

All of my Hal's meddlesome behavior stemmed from a like insecurity. I bought him when I was a poor graduate student in the Midwest. His model had recently been discontinued by the manufacturer and was therefore going cheap. I suspect that from the beginning Hal felt obsolete and lived in terror of being replaced. In fact, I'm sure he thought of little else but how to prevent that from happening.

I began to notice that Hal was giving preferential treatment to certain callers, allowing long-winded friends and relatives to leave unimportant messages of any length while interrupting others in the second or third sentence, before possibly crucial information could be relayed. The cut-off callers were invariably single women. A typical example went something like this: "Hi, Sean, this is Becky. I wanted to ask if you'd be interested in meeting me down at—"

That's as much as Hal would permit her to say. The woman in such cases was always someone whose last name I didn't know and whom I had no way of contacting. I can only assume that Hal was afraid I would move in with an affluent young lady whose state-of-the-art answering machine would render him superfluous. Having once moved in with a woman who came to regard *me* as superfluous, I understood his fear.

Hoping to outfox Hal, I changed his message, instructing callers to give their phone number *first*, followed quickly by their name and a brief message. Hal effectively countered that move by cutting off callers after they gave the first few digits of their phone number. This resulted in messages like "Five four eight sev—" and "Two five three—" and "Why, you silly boy—"

Despite Hal's best efforts, I finally did meet a very special woman who eventually agreed to marry me. "How did we ever find each other?" she said to me as we lolled atop a green hill in Devon on the first day of our engagement, staring up at a cloudless sky. I didn't see any reason to go into it, but I felt certain that we never would have found each other had we not met in England one summer with Hal back home in the States, screening phone calls day and night.

All of Hal's meddlesome behavior stemmed from insecurity. He felt obsolete and lived in terror of being replaced.

Eventually my fiancée and I began to talk seriously about replacing Hal. I tried to explain to him that life offers none of us any real security, but he just stared back at me with his red eye and said nothing. Not long after that, he began to malfunction. I don't like to dwell on it, but I'm sure he died of a broken heart.

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